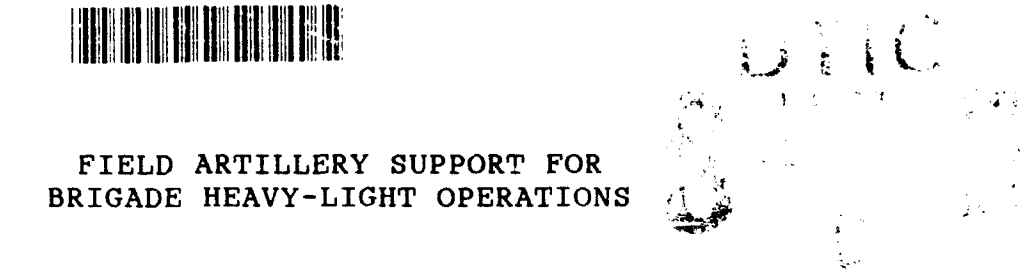

FIELD ARTILLERY SUPPORT FOR BRIGADE HEAVY-LIGHT OPERATIONS

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE

by

MARION L. BURN III, MAJ, USA
B.A., The Citadel, Charleston, South Carolina 1977

Fort Leavenworth, Kansas
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This study investigates the field artillery's (FA) role during brigade heavy-light (H/L) operations. It examines the sufficiency of FA doctrine, and requirements for tactics, techniques, and procedures (TTP) to support this mission. No current field manuals (FM) provide FA TTP for a heavy brigade commander to assist him in conducting this operation. TTP identified as crucial include: a high priority on counterbattery fires during the operation to protect the light force; movement and positioning of FA units to support the H/L operation; designing maneuver control measures and fire support coordination measures to promote execution of fires to the H/L force; a completed fire plan distributed before the beginning of H/L operations; H/L FA rehearsals; and modifications to the FA basic load to support the H/L operation. Other TTP consider the communications requirements for the H/L brigade to include: TACFIRE/non-TACFIRE communications; lack of redundancy and range of the light unit communications systems; and secure equipment compatibility. This study concludes that the brigade H/L mission is sufficiently different from other operations that fire support appendices or a H/L fire support FM should address it.

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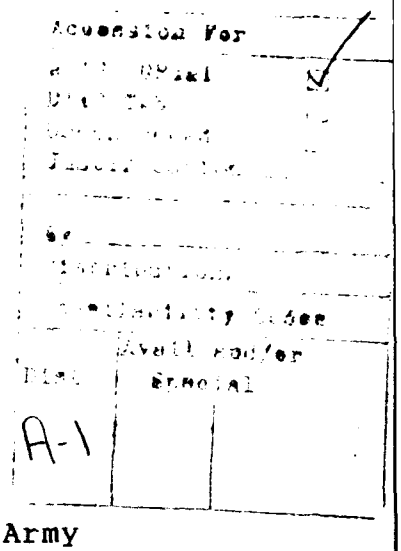

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ABSTRACT

FIELD ARTILLERY SUPPORT FOR BRIGADE HEAVY-LIGHT OPERATIONS by Major Marion L. Burn, III, USA, 117 pages.

This study investigates the role of the field artillery during brigade heavy-light operations. Using historical analysis, this study examines the sufficiency of U.S. field artillery doctrine, and requirements for tactics, techniques, and procedures (TTP) to support this mission.

A key shortfall identified is insufficient fire support TTP manuals for a heavy brigade commander to assist him in conducting this operation. TTP for corrective action include: a high priority on counterbattery fires during the operation to protect the light force; movement and positioning of firing units to support the heavy-light operation; designing maneuver control measures and fire support coordination measures to facilitate execution of fires while providing the requisite protection to the entire maneuver force; a completed fire plan distributed prior to the beginning of heavy-light operations; heavy-light fire support rehearsals; and modifications to the field artillery unit basic load to support the heavy-light operation.

Other TTP consider the communications requirements for the heavy-light brigade to include: TACFIRE/non-TACFIRE communications; lack of range and redundancy of the light communications systems; and secure equipment compatibility.

The study concludes that the brigade heavy-light mission is sufficiently different from other operations and that fire support appendices or a heavy-light fire support field manual should address it.

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CHAPTER 1

INTRODUCTION

> "The future tactical battle will be fought by a mix of heavy and light forces, and our leaders at all levels will have to be experts at handling all the variations of the mix."
>
> LTG John R. Galvin, 1984[1]

This thesis examines the unique considerations that the United States Army field artillery must address when supporting a heavy (mechanized or armor) brigade augmented with a light battalion. Its purpose is to identify those critical doctrinal and non-doctrinal considerations the Fire Support Coordinator must address when supporting the resulting heavy-light operation. The problem can be stated as, "What are the unique field artillery considerations in supporting a brigade heavy-light operation?" This, in turn raises the questions: How is this mission unique? What lessons can history teach us? Is current doctrine adequate? How well do existing field artillery tactics, techniques, and procedures (TTP) apply to supporting brigade heavy-light operations and what are the appropriate fixes to any shortcomings? Are there standardization (equipment) issues?

BACKGROUND

The United States Army is continually tailoring its force structure and modernization efforts to provide a credible deterrence to our enemies. Over the past seven years, the Army has focused these efforts to respond to threats throughout the entire spectrum of conflict. The focus at the mid- to high-intensity end of the ground maneuver spectrum has been the integration of M1 Abrams (tanks) and M2 Bradley (fighting vehicles) into heavy divisions to deter a sophisticated enemy such as the Soviet Union. At the other end of the spectrum, the Army designed light infantry divisions and special operating forces to combat an increasing threat from Third World nations and Soviet surrogates in the form of low-intensity combat. The result is an Army that has improved its capabilities at both ends of the spectrum with regard to war fighting and force structure.[2]

Unfortunately, once it fielded light divisions, the Army spent little time cross attaching heavy units and light units with different force combinations (outside the organic divisional structure) to identify ways to maximize the capabilities of each unit. This oversight has not been as bad as it may seem. Heavy and light units have used the time to refine and solve their separate structure, doctrine, and training problems at the tactical level.

One of the methods the Army employed to overcome this trend of not cross attaching heavy and light units was to conduct rotations at the National Training Center (NTC) with brigades task organized into a heavy-light configuration. The first heavy-light rotation occurred in January 1988. Its purpose was to allow heavy and light units to "capitalize on the unique characteristics of each while off-setting the limitations of the other...[and] to optimize both forces to defeat the enemy while providing the commander an additional range of options which will provide him greater flexibility."[3] From January 1988 through June 1990 there have been eight heavy-light rotations at the NTC.

With the Army's focus on the operational art has come a reorientation from a parochial view of only heavy or light forces fighting in a specified area of operations to one of mixed forces fighting together. The task organization of heavy and light forces to obtain the right combination of firepower, mobility, protection, and capabilities is significantly improving the flexibility of the force. At the same time, it also poses a significant threat to any enemy. As with any mission, the unit's task organization is predicated upon the factors of mission, enemy, terrain, troops available, and time (METT-T).

Before considering the characteristics of heavy-light operations, it is important to recognize the environment in

which heavy units and light units were formed and their strengths and limitations. This discussion will be limited to those strengths and limitations that are not common to each and that can be influenced by friendly field artillery fires.

Light Forces.

In 1983, in response to an increasing number of low-intensity conflicts throughout the world, the Chief of Staff of the Army (CSA) directed the Training and Doctrine Command (TRADOC) to design a light division of approximately 10,000 soldiers. The purpose of this division was to provide deterrence through strategic flexibility. This flexibility included the requirement to be rapidly deployed by 500 or less sorties of C141 aircraft.[4] The design intent was to ensure the United States had the capability to deter aggression in low-intensity conflicts.[5] The CSA recognized that the most likely but least destructive form of warfare for the future would be low-intensity conflict; however, the light division "must be designed...[to] have a 'plug-in' capability for mid- to high-intensity scenarios."[6] With its austere organic combat support and combat service support, the light battalion requires significant augmentation from its parent unit or the heavy unit it is supporting to maintain operations in a mid- to high-intensity conflict.

The following short overview should assist the reader in identifying the strengths and limitations of the Light Infantry Battalion.

Light Infantry Battalion Strengths

1. Relatively difficult to detect on the battlefield due to their small physical, thermal, and electronic signature.[7]

2. Capable of rapid strategic and operational deployment. When augmented with air or ground assets, capable of rapid movement on the tactical battlefield.[8]

3. Can attack to defeat armored enemy forces on light infantry terrain where the advantages of enemy armor mobility and firepower are diminished.[9]

4. Can conduct operations under all climatic conditions and on any terrain against light enemy forces. Uses the terrain to protect the itself from enemy direct and indirect fires and maneuver. [10]

5. Can infiltrate through or around the enemy.[11]

6. Able to task organize with, reinforce, or be reinforced by airborne, air assault, special operations forces, armor or mechanized forces.[12]

7. Able to employ intense small arms and antitank fires for only limited periods.[13]

8. Limited capability to conduct military operations on urban terrain (MOUT).[14]

9. Conducts limited air assault operations. Capable of rapid tactical repositioning of forces despite ground obstacles - for both offensive and defensive operations.[15]

11. Smaller logistical "tail." Can be sustained with relatively few supported assets.[16]

12. Light forces are ideal for establishing antiarmor ambushes as well as hasty protective measures against surprise attacks.[17]

Light Infantry Battalion Limitations

1. Tactical mobility is constrained by limited organic vehicles and aircraft.[18]

2. Limited self-support capability.[19]

3. The support functions within the battalion have little redundancy in personnel.[20]

4. Light battalions cannot move as quickly as mounted forces on terrain that is favorable to vehicular movement. They should be positioned on restrictive terrain where enemy mobility is limited to that of the light force's mobility.[21]

5. Light battalions have a low density of mortar and antiarmor weapons. They cannot sustain a high volume of fire for a prolonged period. Attacks and defenses need to isolate the target from reinforcements, artillery support, and

withdrawal routes to limit the response capability of the enemy.[22]

6. The vulnerability of light infantrymen to enemy artillery compels them to use cover and concealment for protection from enemy indirect fires.[23]

7. NBC attacks are a significant threat due to a lack of NBC equipment, reconnaissance, decontamination, or quick mobility to move out of the contaminated area.[24]

8. Limited smoke production capability. Light forces rely upon smoke, camouflage and other means of concealment during operations to survive.[25]

9. Light forces require air superiority for air assault operations. They also require suppression of enemy air defenses (SEAD) for these operations.[26]

10. Organic communications means (PRC-77) has limited range (less than 8 kilometers without a directional antenna).

11. Light units currently have no digital equipment that allows them to communicate with TACFIRE tactical fire control computer system. Therefore the light battalion fire support observers use voice calls for fire to the heavy brigade's direct support field artillery battalion. These voice missions must be manually input into the TACFIRE computer for execution.

12. Limited combat support and combat service support. May require augmentation with command and control assets, air

defense artillery, fire support, NBC, and liaison teams, and sustainment.

Heavy Forces.

The current heavy forces evolved during the past 35 years; World War II, the Korean Conflict, and the Vietnam Conflict each influenced the structure of the heavy force in some manner. Until recently, the greatest ground threat facing the United States was a major assault by the Soviet Union into Europe. This perceived threat resulted in the Army structuring the forward-deployed heavy forces to effectively deter conflict in that area of operations. This tailoring of the heavy force for a European contingency is highlighted by the strengths and limitations that follow.

Heavy Brigade Strengths

1. Conducts nuclear and chemical operations with organic delivery systems.[27]

2. Conducts sustained, mobile combat operations against enemy heavy forces in a conventional, chemical and nuclear environment.[28]

3. Capable of task organization with light, air assault, airborne, or other armored and mechanized forces.[29]

4. Capable of synchronizing Army aviation, close air support, and indirect fires to support the scheme of maneuver

and thus fight throughout the battlefield framework - deep, close, and rear.[30]

5. Operates as an attack or counterattack force and accomplishes rapid movement in exploitation and pursuit. Capable of seizing terrain, penetrating or enveloping defenses or strongpoints.[31]

6. Conducts defensive operations by dispersing over great distances and by concentrating rapidly.[32]

7. Rapidly exploits success in the offense or defense, to include the effects of nuclear, chemical, and conventional fires.[33]

8. Provides organic air defense against low altitude hostile aircraft.[34]

9. Conducts limited air assault operations with subordinate elements to quickly seize critical objectives.[35]

10. Vehicle mounted radios provide greater range than man-packed radios.

11. The TACFIRE computer system automates many of the fire support functions. It processes digital calls for fire to optimize the speed of computers in solving the tactical and technical gunnery solution.

Heavy Brigade Limitations

1. Takes longer to strategically deploy due to substantial quantities of heavy equipment.[36]

2. Primary dependence on radio communications. This make forces vulnerable to radio electronic combat (REC).[37]

3. High consumption rate of supply items, especially Classes III, IV, V, and IX.

4. Vulnerable to enemy antiarmor weapons.

5. Tank elements have difficulty in defending positions against enemy dismounted infantry primarily due to austere local security/dismount forces.

6. Restricted mobility in jungles, dense forests, mountainous terrain, and built up areas.[38]

7. Only capable of conducting limited infiltrations.

8. Lack of infantry to conduct long duration or continuous dismounted infantry operations.

Summary of Heavy Brigade and Light Infantry Battalion Capabilities and Limitations.

The preceding list of heavy brigade and light battalion capabilities underscore their differences. Heavy brigades, with their armor protection and mobility, are less vulnerable to enemy indirect fires. Conversely, light battalions are vulnerable to these fires and cannot move quickly to escape their effects. Heavy brigades require less constrictive terrain to optimize their inherent speed, mobility, and weapon system range, whereas the capabilities of light battalions are most effective on restrictive terrain that

provides protection (through cover and concealment) and takes advantage of their foot mobility.

A committed heavy brigade has a direct support field artillery battalion that utilizes the TACFIRE computer system to process digital calls for fire. Each of the heavy battalions within the heavy brigade have six 107mm mortars They process voice calls for fire manually. A light infantry battalion has six 60mm mortars and manually processes voice calls for fire to these mortars. The heavy and light force mortars cannot currently communicate with the TACFIRE (field artillery) computer system.

Heavy brigades have antitank weapon systems designed to engage a heavy enemy unit; light battalions have a limited number (eighteen) of antitank weapon systems. The heavy brigade has only a limited ability to conduct dismounted operations. The light battalion by design conducts dismounted operations. Finally, heavy brigade can operate in a NBC environment, whereas a light battalion has a limited capability to operate in these conditions.

Table 1 depicts and compares the strengths and limitations of heavy brigades and light battalions with respect to maneuver, protection, and firepower. Fire support augmentation to light forces and heavy forces will improve those factors rated 'Fair' with respect to firepower and protection.

Table 1

COMPARISON OF ORGANIC CAPABILITIES OF HEAVY AND LIGHT UNITS

	Strategic Maneuver	Tactical Maneuver	Protect'n	Firepower AT Weapon	Firepowr Dir/Arty
Light IN Bn	Best[1]	Limited[2]	Fair	Limited[7]	Fair[10]
Airborne Bn	Excellent	Fair[3] Limited[4]	Fair	Good[7]	Fair
Air Aslt Bn	Good	Excell't[5] Limited[6]	Fair	Excell't[7]	Fair
Infantry Bn	Limited	Good	Fair	Good[8]	Fair
Mtzd IN Bde	Good	Excellent	Good	Excell't[8]	Excell't
Mech IN Bde	Poor	Best[9]	Excellent	Best[8]	Best
Armored Bde	Poor	Best[9]	Excellent	Best[8]	Best

SOURCE: U.S. Army Infantry School and Center. "Light Infantry," Unpublished briefing slide, 1987. (Modified by author)

1 Requires 25% fewer sorties than airborne division.
2 Excellent in restricted terrain.
3 Can transport one infantry battalion w/organic helicopters.
4 After parachute assault, is essentially footmobile.
5 Excellent due to two organic utility helicopter battalions.
6 Essentially footmobile when not using organic helicopters.
7 Only has eighteen Dragon Medium Antitank Missiles (a chemical energy anti-tank weapon) per light infantry battalion.
8 Has kinetic energy & chemical energy anti-armor capability.
9 Limited in restricted terrain
10 Light infantry battalion has six 60mm mortars (two per company).

WHY HEAVY-LIGHT OPERATIONS?

The Army currently has seventeen active divisions. Eleven of these are heavy divisions and six are light divisions. With light divisions comprising over one-third of the active force, it is likely that in any future mid- to high-intensity conflict heavy forces will be augmented with light forces. Conversely, any low-intensity conflict may see the commitment of heavy forces to augment light forces.

In his seminal work on combined arms warfare, Jonathan House identified military trends or principles that have recurred throughout the twentieth century. Two trends he identified have direct bearing upon heavy-light operations.

The first trend he identified is the tendency of major armies to integrate more arms and services at progressively lower levels of organization. By doing so, Dr. House avers that armies combine different capabilities of mobility, protection, and firepower to pose a more complicated threat to enemy units. He continues this observation by stating that this integration does not mean a permanent organization, but rather one in which the different arms train together while changing task organization frequently. By doing so, units are able to respond to varying terrain, enemy, and missions.[45] Augmenting heavy brigades with light infantry forces to perform specific missions fits within these parameters.

Dr. House's second trend relates to the use of specialized arms and/or elite forces. Often, light forces are utilized to conduct specialized missions. These assignments include such missions as low intensity conflict (LIC), military operations in urbanized terrain (MOUT), or infiltration. Dr. House states that the use of forces with special capabilities must be balanced against their vulnerabilities when not supported by other arms.[46] The flexibility attained through their use must justify the concomitant risk. The light force requirement for protection from enemy indirect systems, resupply from the unit it is augmenting, and transportation to move tactically on the battlefield underscore this trend noted by Dr. House.

With these points in mind, Figure 1 illustrates the spectrum of conflict that can present itself to U.S forces. The figure shows RISK (to the United States), the level of conflict (eg. LOW, MID, HIGH [intensity]), and PROBABILITY (of occurrence).[47] The brigade commander positions light and heavy forces on the battlefield so that terrain, the force's respective combat power, and their capabilities are complementary and optimized.

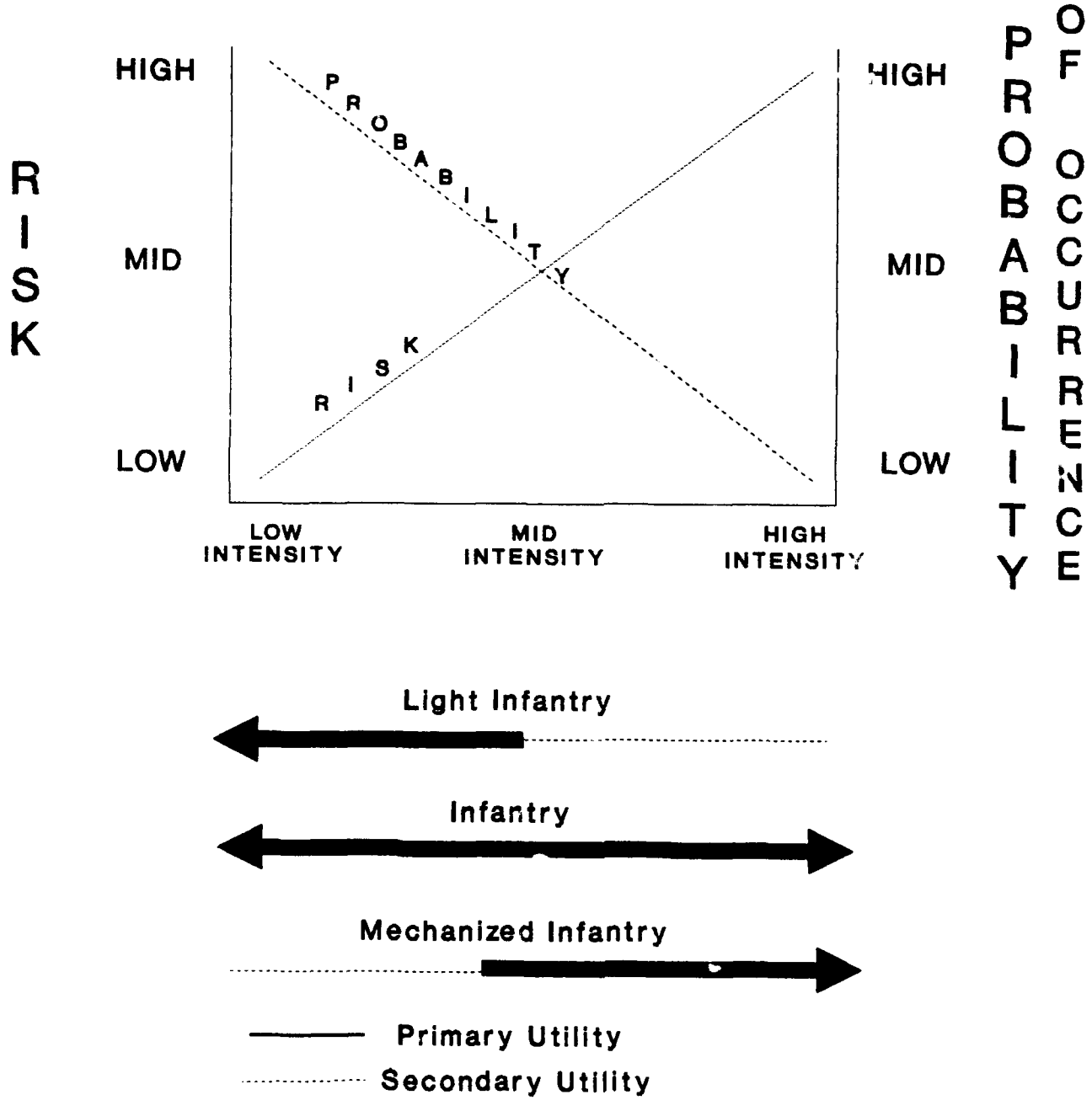

Fig. 1. Spectrum of Conflict

Figure 2 identifies the terrain and combat power factors that influence the employment of heavy, heavy-light, light-heavy, and light forces. This figure assists in identifying where these disparate units' capabilities can best be applied based upon the terrain and combat power variables.[48]

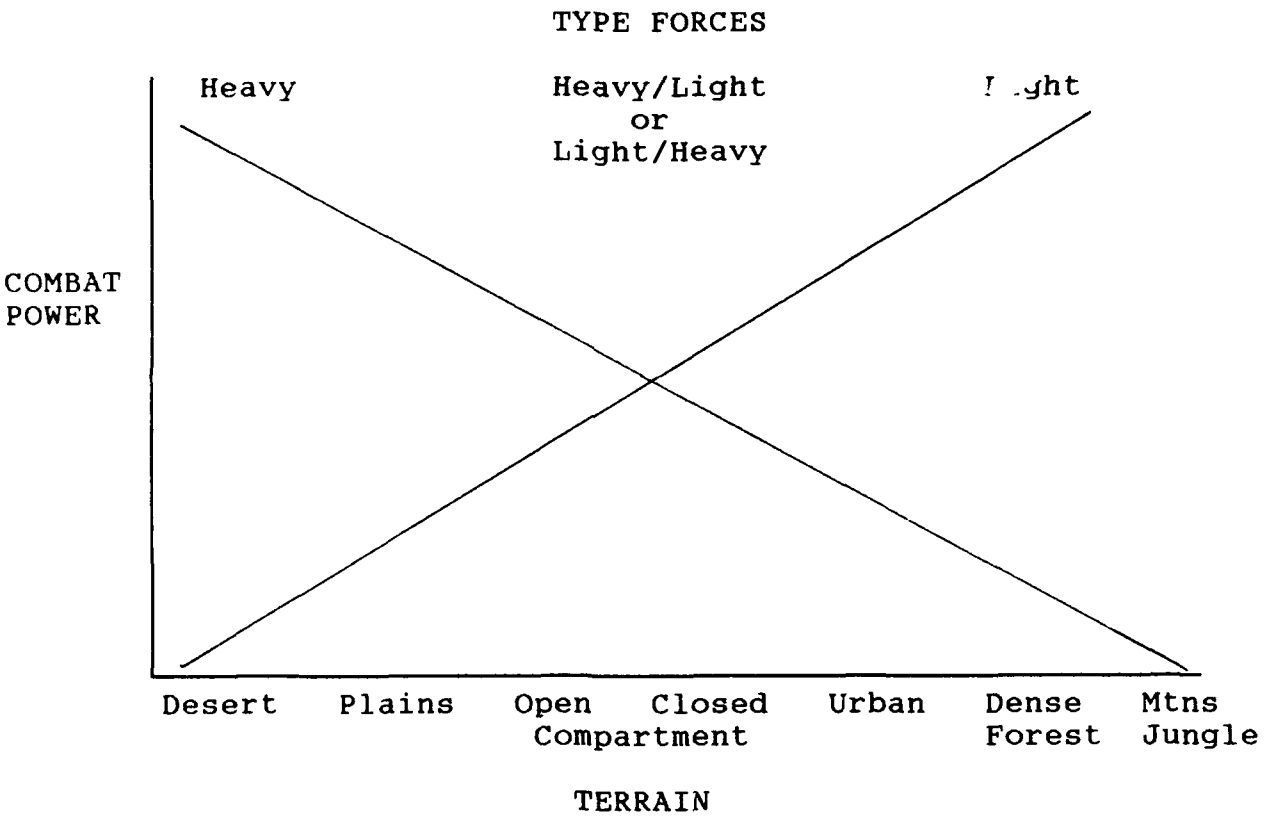

Fig. 2. Terrain considerations when employing a heavy-light force.

ASSUMPTIONS

This thesis is predicated upon the following assumptions:

1. The Army will continue to task organize its forces based upon the factors of Mission, Enemy, Terrain, Troops available, and Time (METT-T) to conduct combat missions. This will result in military operations executed by a mixture of heavy and light forces. Heavy and light forces will be task-organized at heavy brigade level.

2. Units will be employed in consonance with current doctrine and the unit's mission capabilities. Doctrine has not changed.

3. The source of many tactics, techniques, and procedures will be from unit after action reviews (AARs), trip reports, internal lesson learned memorandums, published articles, and unpublished Master of Military Arts and Science theses. These sources accurately represent lessons learned during heavy-light operations.

4. For purposes of this thesis, the light battalion attached to the heavy brigade will deploy with only its organic assets and normal slice. This slice will include its fire support teams (FISTs), ADA (Stinger platoon), smoke/decontamination platoon, and a light transportation company (-).[49]

5. Battles conducted at the National Training Center represent how units will fight in combat. Therefore, NTC

Take Home Packages (THP) will illustrate many of the field artillery considerations for supporting brigade heavy-light operations.

6. Force integration problems will continue to develop as modernization affects the structure of heavy and light forces.

DEFINITION OF TERMS

A knowledge of doctrinal terms is necessary to ensure a mutual understanding of the salient points of this thesis. I will use standard U.S. Army terminology throughout this thesis. The following definitions are provided to ensure clarity.

o Amicicide. The incidence of casualties incurred by military forces in active combat operations as a result of being fired upon unintentionally by the weapons of their own or allied forces.[50]

o Augmentation. A command relationship where units that are designated to augment another force are not available to the losing command for the period of augmentation.[51]

o Call for Fire (CFF). A concise message requesting fire support assets. A digital CFF is a digital burst transmission originating from a TACFIRE peripheral known as a Digital Message Device (DMD) using a standard frequency

modulated (FM) radio. A voice CFF is a standardized format voice request on a FM radio.[52]

o Counterfire. Fire intended to destroy, neutralize, or suppress enemy indirect fire systems.[53]

o Critical Friendly Zone (CFZ). An area within friendly territory that is considered sensitive. Any hostile projectiles predicted to impact in this zone will result in an immediate call for fire to attack the hostile system. A Q36 or Q37 countermortar/counterbattery radar will identify the location of the hostile system and initiate either a voice or a digital CFF.[54]

o Direct Support (DS). A mission requiring a field artillery unit to provide fire support to a specific maneuver force and authorizing it to answer directly the supported force's request for assistance. This relationship ensures rapid response from the supported force.[55]

o Doctrine. Fundamental principles by which the military forces guide their actions in support of objectives. It is authoritative but requires judgement in action.[56]

o Fire Support. The collective and coordinated use of indirect-fire weapons, aircraft, and other lethal and nonlethal means in support of a battle plan. Fire support includes mortars, field artillery, naval gunfire, air defense artillery in secondary mission, and air-delivered

weapons. Nonlethal means are illumination, smoke and electronic warfare systems within the military intelligence organizations. The force (maneuver) commander employs these means to support his scheme of maneuver, to mass firepower, and to disrupt, delay, or limit enemy forces in depth.[57] (This thesis will only consider field artillery and mortar fires.)

o Fire Support Coordinating Measures (FSCM). Measures, established by the supported maneuver commander on the basis of recommendations by the FSCOORD, that are designed to facilitate the rapid engagement of targets and, at the same time, provide safeguards for friendly forces. The FSCOORD's recommendations are based upon the battle plan, the force commander's guidance, and anticipated enemy actions. With the exception of boundaries, FSCM are either permissive or restrictive.

- Permissive. A FSCM whose primary purpose is to facilitate the attack of targets. Examples are: Coordinated Fire Line (CFL), Fire Support Coordination Line (FSCL), and a Free Fire Area (FFA).

- Restrictive. A FSCM that imposes certain requirements for specific coordination before engagement of targets affected by the measure. Its purpose is to protect friendly forces. Examples are: Restricted Fire Area (RFA), No Fire Area (NFA), and a Restricted Fire Line (RFL).[58]

o Fire Support Coordinator (FSCOORD). The senior field artillery officer at each echelon above maneuver platoon level who serves as the principal advisor to the commander for the planning and coordination of all available fire support.[59] At company, he is known as the Fire Support Team Chief or FIST.

o Fire Support Element (FSE). A functional portion of a force tactical operations center (TOC) that provides centralized targeting, coordination, and integration of fires delivered on surface targets by fire support means under the control of or in support of the force. This element is staffed from the field artillery headquarters or field artillery staff section of the force and representatives of other fire support means.[60]

o Fire Support Officer (FSO). The FSCOORD for maneuver battalion and company. At brigade, he is the FSCOORD's personal representative to the brigade commander.[61]

o Heavy brigade. A heavy brigade will have a Headquarters and Headquarters Company, and from two to five mechanized and/or armor battalions. Normally, an armor brigade will have two armor battalions and one mechanized battalion. Conversely, the mechanized brigade will have two mechanized battalions and one armor battalion. (Figure 3 illustrates a typical heavy brigade.) Once committed, the heavy brigade can expect augmentation with the following slice elements from the division:

- a Forward Support Battalion (FSB) responsible for logistical requirements.

- an engineer company

- an air defense artillery (ADA) battery

- a field artillery battalion (DS) augmented with a Q36 FIREFINDER (countermortar/counterbattery) radar. The heavy brigade may also receive additional field artillery units with a mission to reinforce the DS battalion.[62]

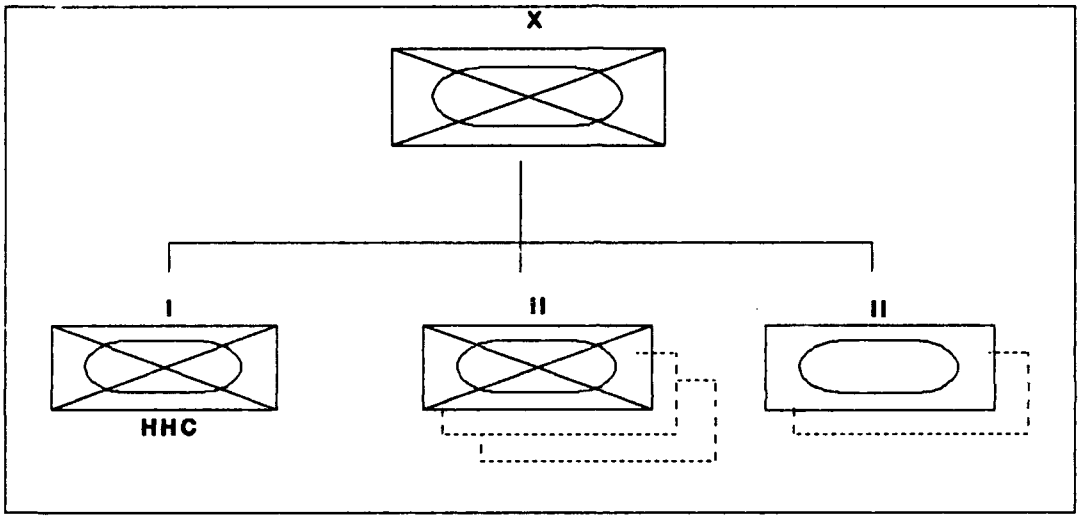

Fig. 3. Typical heavy brigade.

o Heavy-light brigade (H/L). A heavy-light brigade is an organization that has been task-organized with both heavy and light combat maneuver units. To be designated a heavy-light brigade, the parent brigade must have an organic heavy base, and the logistics support associated with that brigade. An armor brigade in a mechanized infantry division with one tank battalion, one mechanized infantry battalion, and one light infantry battalion is an example of a heavy-

light brigade.[63] However, another example of a heavy-light brigade is an mechanized brigade with a armor battalion, a mechanized battalion, and two light battalions.

o Light battalion. The various kinds of light battalions include infantry, light infantry, airborne, and air assault. For purposes of this thesis, fire support for heavy-light operations will be considered the same, regardless of the type of light battalion augmenting the heavy brigade. Each light battalion has a Headquarters and Headquarters Company and normally three line companies. The light infantry battalion's major weapon systems are six 60mm mortars (two per company), and eighteen Dragon Medium Anti-tank Missiles (six per company) [64] (Figure 4 depicts the organization of a typical light battalion.)

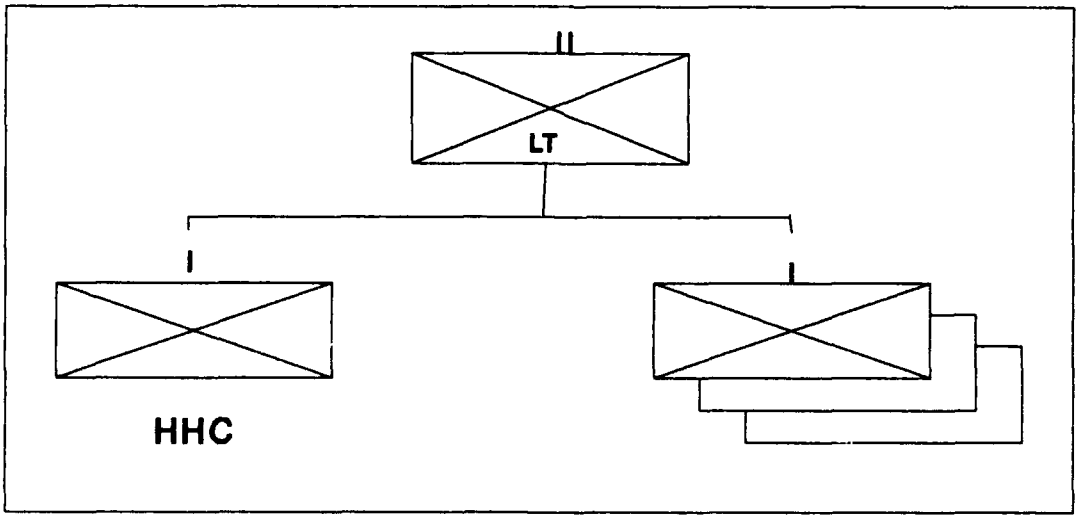

Fig. 4. Typical light battalion.

o Light TACFIRE. An automated fire direction system that is currently under development for fielding into light units. It will be able to communicate with the TACFIRE system.

o Suppression of Enemy Air Defenses (SEAD). That activity that neutralizes, destroys, or temporarily degrades enemy air defense systems in a specific area by physical attack and/or electronic warfare (EW) to enable tactical air operations to be successfully conducted.[65]

o TACFIRE/non-TACFIRE Operations. Operations between field artillery units fielded with the Tactical Fire Direction System (TACFIRE) - an automated fire direction system that receives its CFF in a digital format - and a non-TACFIRE unit that processes only voice CFFs.[66]

o Tactics, Techniques and Procedures. Each term has a separate definition. However, doctrine writers normally use the abbreviation 'TTP' when discussing actions or aspects that can be used to accomplish doctrinal tenets. TTP are not doctrinal tenets.

- Tactics. The employment of units in combat or the ordered arrangement and maneuver of units in relation to each other and/or the enemy in order to utilize their full potentialities.[67]

- Techniques. The basic method of using personnel and equipment in combat and training. It provides

detail to leaders and commanders on "how-to" actually carry out assignments.[68]

- Procedures. A particular course or mode of action that describes how to perform a certain task or a collection of related tasks.[69]

o Take Home Package (THP). A collection of audio, audio-visual, and written products given to a unit that has rotated to the National Training Center. They are used to enhance home station training. This feedback provides the rotational unit an overview and assessment of the planning, preparation, and execution for each of their missions as they relate to the seven battlefield operating systems.[70]

o The following manuals define all other operational terms and concepts used throughout this thesis:

JCS Pub 1-02, Department of Defense Dictionary of Military and Associated Terms

FM 100-5, Operations

FM 101-5-1, Operational Terms and Symbols

FM 6-20, Fire Support in the AirLand Battle

FM 6-20-30, Tactics, Techniques and Procedures for Fire Support for Corps and Division Operations

FM 6-20-40, Tactics, Techniques and Procedures for Fire Support for Brigade Operations (Heavy)

FM 6-20-50, Tactics, Techniques and Procedures for Fire Support for Brigade Operations (Light)

FM 71-3, The Armored and Mechanized Infantry Brigade

THESIS LIMITATIONS

1. This thesis will only consider heavy-light operations executed and documented from World War II to present.

2. Currently, there is no active proponent for heavy-light operations. Doctrinal sources do not address these operations in any systematic manner. Primary source material is scattered throughout the Army in the form of AARs, articles, and other published and unpublished materials. An Army proponent has not formally collected and categorized this material.

3. This thesis will only address fire support considerations for indirect fire systems (eg. tube artillery, mortars, and multiple launch rocket systems (MLRS)). The special considerations for support employing aircraft and naval gunfire will not be addressed.

4. This thesis will not consider fire support requirements for Ranger/Special Operations Forces conducting operations in concert with heavy forces, although many of the problems are similar.

5. The Army constantly changes unit Tables of Organization and Equipment (TOE). These changes affect unit organization, modernization of equipment, and may influence

TTPs. This thesis will not attempt to account for these factors.

6. This thesis will not consider classified sources, such as After Action Reviews (AARs), lessons learned reports, or classified operations orders.

7. Future fielding of the Light TACFIRE system and its ability to conduct parallel operations with heavy TACFIRE will not be addressed.

DELIMITATIONS

1. Four types of light infantry divisions are in the current force structure. They are the infantry division "straight leg," the airborne division, the air assault division, and the infantry division (light).[71] There are three types of heavy divisions in the current force structure. They are the armor division, the infantry division (mechanized), and the motorized division. This thesis will regard the fire support considerations for all light battalions attached to heavy brigades as equal.

2. This study will not specifically challenge whether a heavy-light brigade has more or less application on the battlefield than a non- heavy-light brigade.

3. This study will not include a major historical review. However, it will include vignettes in Chapter 3 to show that heavy-light operations are not a new type of

operation. Although heavy and light forces have been task organizing throughout history, this thesis will only consider those conducted from World War II to present.

SIGNIFICANCE OF THE STUDY

The United States Army is continually orienting its force modernization and restructuring efforts to ensure it is capable of deterring aggression. Many of these efforts have focused on its response to threats from the low-intensity to the high-intensity spectrum of war. When the forces from either end of the spectrum are cross attached to conduct heavy-light operations, little or no doctrine exists to identify ways to optimize the capabilities of each component of the heavy-light mix. Field artillery focus for light forces is significantly different from its focus in supporting heavy forces. This thesis will identify those critical considerations for fire support agencies when they support a heavy-light brigade.

ENDNOTES

1. John R. Galvin, "Heavy-Light Forces and the NATO Mission," INFANTRY MAGAZINE 74 (July-August 1984): 1.

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3. Michael J. Shadell, briefing to BG Funk and Operations Group on 17 October 1987 (pre-rotation brief), "Heavy-Light Focused Rotation 88-6: Rotation Collection Goals."

4. U.S. Army, "Independent Evaluation Report (EIR) for Certification of the Light Infantry Division, Volume I, Main Report," (Combined Arms Center: Ft. Leavenworth KS, March 1987): i. (hereafter cited as EIR.)

5. David L. Poston, "Light Infantry Augmentation to Heavy Livisional Forces in Europe: A European Heavy-Light Primer," (MMAS Thesis, U.S. Army Command and General Staff College, Ft. Leavenworth KS, 1989): 4.

6. EIR, i.

7. United States Army Infantry Center, United States Army Functional Area Operational Concept for Close Combat Heavy and Close Combat Light Forces, (USAIC, Ft. Benning, GA, undated): 1.

8. James M. Moon, Heavy-Light Operations, Considerations to Optimize the Capabilities of Both Units, (Draft, 1987): 5. (hereafter known as Heavy-Light Operations)

9. William E. Dupuy, "The Light Infantry: Indispensable Element of a Balanced Force," ARMY (June, 1985): 40.

10. FC 71-101-3, 1-5.

11. U.S. Army, FM 7-71, Light Infantry Company, (Washington:28 August 1987): 1-3.

12. Ibid., 86.

13. FC 71-101-3, 1-5.

14. Heavy-Light Operations, 5.

15. David Eshel, MILITARY REVIEW, Summary on: "The US Army Light Division - Right or Wrong?," (January 1988): 85.

16. Heavy-Light Report, 1-4.

17. Steven L. Canby, "Classic Light Infantry and New Technology," (Arlington, Virginia: C & L Associates [Defense Consultants] for Director, Defense Advanced Research Project Agency, 1981): iii through ix.

18. U.S. Army, FM 7-72, Light Infantry Battalion, (Washington, DC, March 1987): 1-6.

19. Heavy-Light Report, 1-4.

20. Ibid., 1-4.

21. FM 7-71, 1-3.

22. FM 7-71, 1-3.

23. Charles A. Peddy, "The Light Infantry Division: No Tool for the Tactical Commander," (SAMS Monograph, U.S. Army Command and General Staff College, Ft. Leavenworth KS, 1989): 7.

24. Scott R. McMichael, A Historical Perspective on Light Infantry, (U.S. Army Command and General Staff College, Fort Leavenworth KS, 1987): 223, 226-228.

25. Scott, 226.

26. Ibid., 1-6.

27. Heavy-Light Operations, 7.

28. Ibid., 7.

29. Heavy-Light Report, 1-7.

30. Ibid., 1-7.

31. Ibid., 1-7.

32. FM 7-71, 1-3.

33. Heavy-Light Report, 1-6.

34. Heavy-Light Operations, 8.

35. Ibid., 8.

36. Heavy-Light Operations, 8.

37. FC 71-100, 1-8.

38. U.S. Army, FM 71-100, Division Operations, (Washington, DC: Department of the Army, 1988): A-1 to A-2.

45. Jonathan M. House, Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine and Organization, (U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1984): 188.

46. Ibid., 189.

47. U.S. Army, "Report to the Congress of the United States of America on the Army's Long-Range Plans for Fielding Light Divisions," (Washington, DC: Office of the Chief of Staff, April, 1985.

48. David L. Poston, "Light Infantry Augmentation to Heavy Divisional Forces in Europe: A European Heavy-Light Primer," (MMAS Thesis, U.S. Army Command and General Staff College, 1989): 98.

49. U.S. Army, FM 71-3, Armored and Mechanized Infantry Brigade, (Washington, DC: Department of the Army, May 1988): A-2.

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52. U.S. Army, FM 6-30, Observed Fire Procedures, (Washington: Department of the Army, June 1985): 4-1...4-4.

53. U.S. Army, FM 101-5-1, Operational Terms and Symbols, (Washington: Department of the Army, 1987): 1-20.

54. U.S. Army, FM 6-161, Field Artillery Radar Systems, (Washington: Department of the Army, March 1986): 6-22.

55. FM 101-5-1, 1-26.

56. JCS Pub 1, Department of Defense Dictionary of Military and Associated Terms, (Washington, DC: The Joint Chiefs of Staff, 1987): 118.

57. U.S. Army, FM 6-20, Fire Support in the AIRLAND Battle,(Washington DC: Department of the Army, 1988): 1-2.

58. U.S. Army, FM 6-20-30 Tactics, Techniques and Procedures for Fire Support for Corps and Division Operations, (Washington, DC: Department of the Army, 1989): F-1 through F7.

59. Ibid., 1-32.

60. Ibid., 1-32.

61. U.S. Army, FM 6-20-40, Tactics, Techniques, and Procedures for Fire Support for Brigade Operations (Heavy), (Washington: Department of the Army, January 1990): 1-3...1-5.

62. FM 71-3, 1-5...1-6.

63. Poston, 40. FM 71-100 Division Operations, (pg. A-8) states the preferred option when task organizing heavy-light units at the brigade level is to attach a light battalion to a heavy brigade.

64. Ibid., 25.

65. FM 101-5-1, 1-68.

66. U.S. Army, ARTEP 6-400-1, The Field Artillery Cannon Battalion - TACFIRE, (Washington: Department of the Army, June 1984): 3-13 to 3-14.

67. U.S. Army, Doctrinal Terms: Doctrine, Tactics, Techniques, and Procedures, TRADOC Pam 34-1 (Ft. Monroe, VA: Government Printing Office, July 1984): 6.

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71. Ibid., 44.

CHAPTER 2

REVIEW OF LITERATURE

> "The Marine who understands that doctrine contains fundamental principles and who further understands those principles that lie in his area of warfare is the Marine who can choose the tactics, techniques, and procedures that suit his situation."
>
> LtCol Peter S. Morosoff, 1986[1]

INTRODUCTION

Lieutenant Colonel Morosoff's quote above applies to the U.S. Army no less than it does to the U.S. Marine Corps. Doctrinal manuals are the underpinning that guides military actions. They help structure the battlefield and allow the commander to determine what needs to be done. Tactics, techniques and procedures (TTP) manuals provide the commander ways to accomplish quickly what needs to be done.

This chapter will review appropriate Army doctrinal and TTP manuals. Additionally, it will review previous MMAS theses, recent professional articles, and other applicable sources. These include applicable studies conducted by the Center for Army Lessons Learned (CALL), NTC Observation Division (NOD), the NTC Take Home Packages(THP), and the RAND Corporation.

Numerous doctrinal sources exist that describe the recommended employment techniques for light forces or heavy forces, and the requisite fire support for each.

Figure 5 depicts the method by which fire support doctrine is integrated with maneuver doctrine through a family of field manuals. These FMs support the tenets of the Army's AirLand Battle doctrine as espoused in FM 100-5, Operations. The series of TTP manuals in the bottom part of the figure are more specific in showing how the doctrine is applied and practiced at the various levels of command.

In addition to field manuals, there are other excellent sources of information on heavy-light forces. These sources are monographs and theses published at the Command and General Staff College, professional journals and books, and Take Home Packages (and other Lessons Learned products) from the Combat Training Centers (CTCs). Each provides an analysis of heavy-light operations, as well as identifying unique fire support considerations for these operations.

This chapter's review of literature will underscore the importance of these sources. Theses, monographs, CTC Take Home Packages, and professional articles and books represent the current thought and lessons learned from units in the "field." Thus, these sources can furnish incisive insights into how units conducting heavy-light operations are applying the doctrine and the TTP that relate to this operation. When these

lessons are juxtaposed with doctrine and TTP, this may cause modifications to field manuals.

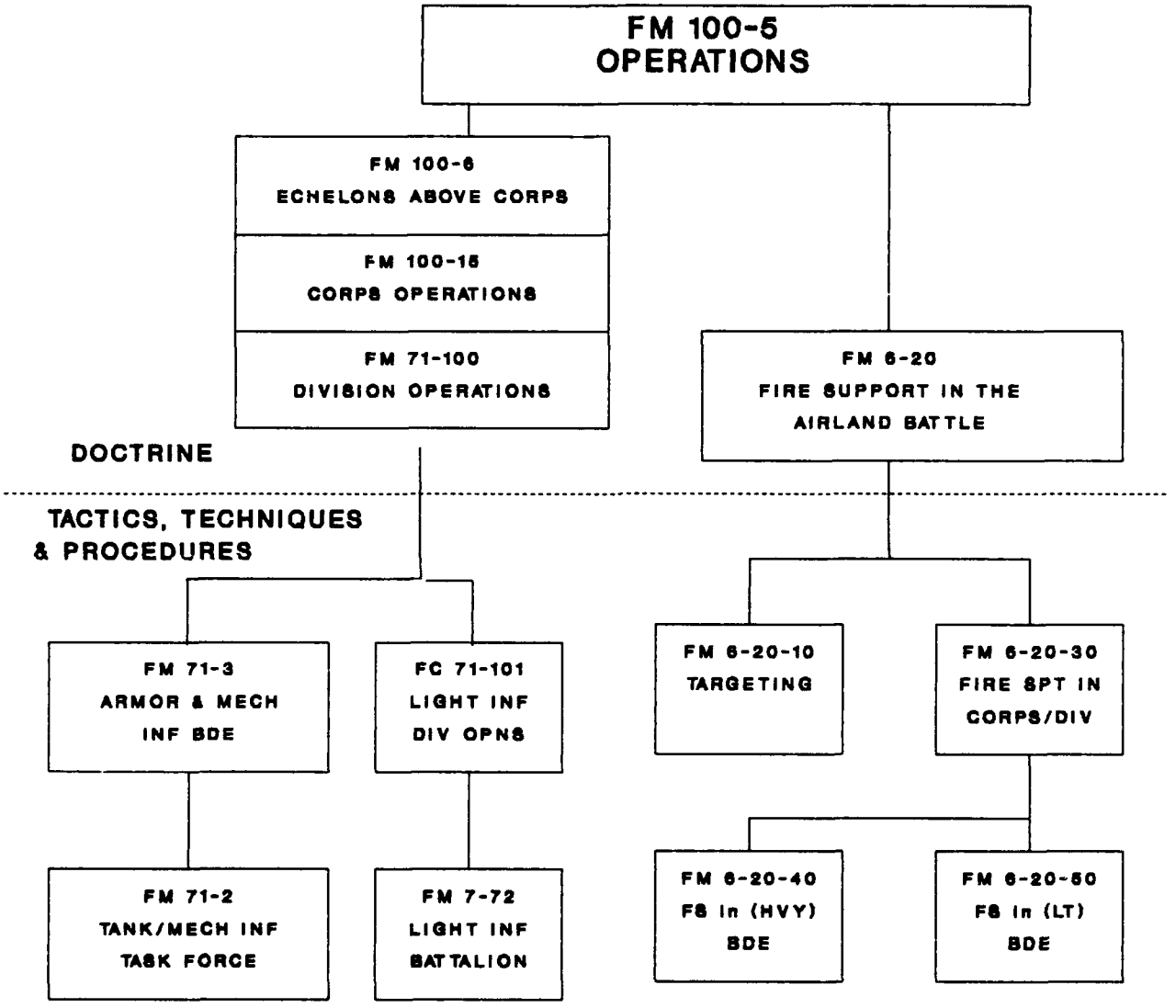

Figure 5. Family of Manuals for Doctrine, Tactics, Techniques, and Procedures.

LITERATURE REVIEW

The remainder of this chapter is divided according to the following scheme:

- o Doctrine (FM 100-5, FM 100-15, FM 71-100, FM 71-3, FM 6-20-30, FM 6-20-40, and FM 6-20-50)
- o Unpublished MMAS theses and SAMS Monographs.
- o Articles in professional journals.
- o Lessons learned products (After Actions Reviews, CTC Take Home Packages, CALL Bulletins, and various information papers)
- o Books and Other Sources

This chapter's discussion of literature and sources is not complete and comprehensive; however, additional sources found in the endnotes and the bibliography of this thesis can supplement the reader with additional heavy-light information.

Doctrine.

As the Army's keystone warfighting manual, FM 100-5 Operations[2] provides the doctrinal premise for heavy-light operations and the attendant fire support requirements. It also provides the basis for other doctrinal and TTP manuals in an effective manner. Throughout this field manual there are vignettes concerning heavy-light operations. The light and heavy experience of one of the primary authors no doubt influenced this integrated view.[3]

FM 100-15 Corps Operations[4] and FM 71-100 Division Operations[5] address echelons outside the focus of this thesis. However, since these manuals are doctrinal, they influence the TTP written in those lower echelon FMs that are the focus of this paper. FM 100-15 devotes only two pages to heavy-light operations. The thrust of these short narratives is that command and control (C^2) and Combat Service Support (CSS) are difficult and demanding for heavy-light operations. FM 71-100 addresses these operations in more depth. Figures A-1 (Heavy missions and light tasks), A-2 (Light missions and heavy tasks) and A-7 (Light battalion allocation)[6] reflect an acceptable foundation for both heavy and light tasks to adequately support the missions of the opposite force. Fire support augmentation to protect and assist the light force is addressed, but not in any detail. The section on augmentation requirements for heavy and light units when task organizing with one another is well thought-out. The offensive and defensive scenarios described in this Appendix do not address such crucial considerations as counterfires to protect the infiltration of the light force or the use of SEAD missions to protect an air assault mission. These common tenets are not adequately described in many operations. The discussion on use of heavy-light forces (and fires) in deep operations is well-documented.[7]

FM 71-3 Armored and Mechanized Infantry Brigade[8] provides doctrinal considerations for division and corps commanders when

planning heavy-light operations. These primarily deal with organizational considerations (augmentation, attached, time constraints), rather than those of a tactical nature. This manual does discuss how terrain considerations influence the employment of heavy-light forces so that their strengths are optimized while reducing their weaknesses. The entire Appendix A - Heavy/Light Forces - provides one recommendation for the employment of fire support assets for heavy-light operations. This consists of a reminder to the commander of the heavy-light operation that he must -

> "consider the range of the indirect-fire support of [a] light unit that has been cut off. It may be necessary to give the light [unit] priority of fire from artillery systems that normally support the heavy brigade."

This Heavy/Light Forces Appendix constitutes four written pages in FM 71-3.

FM 6-20 Fire Support in the AirLand Battle[9] provides excellent doctrinal guidance to fire support personnel and maneuver commanders alike. As a doctrinal, vice TTP, manual it provides doctrinal tenets as effectively as FM 100-5. For example, it outlines seven doctrinal responsibilities that a field artillery unit must fulfill based upon the type of mission (eg. direct support) that it is conducting. (see Table 2)[10]

The discussion on combat power in the first chapter of FM 6-20 applies to the entire spectrum of war and those forces

employed within that spectrum. The basic fire support tasks, also in Chapter 1, outline fundamental doctrinal precepts that apply to heavy-light operations as well as operations employing only heavy or light units. Finally, the section regarding doctrinal considerations when organizing field artillery units for combat,[11] applies to all maneuver operations that require fire support.

As a doctrinal field manual, FM 6-20 provides all the necessary tenets to ensure the field artillery accomplishes its mission.

"Heavy and Light Forces Mix," is the title of a section in FM 6-20-30 Tactics, Techniques and Procedures for Fire Support for Corps and Division Operations[12]. Doctrinally, this FM states that fire support principles of planning and support do not change for a heavy and light mix in a mid- to high-intensity conflict. Less than one page is devoted to operations conducted by combined heavy and light units. Although a TTP field manual, this FM provides no TTP for supporting heavy-light operations.

Neither FM 6-20-40 Tactics, Techniques and Procedures for Fire Support for Brigade Operations (Heavy)[13] nor FM 6-20-50 Tactics, Techniques and Procedures for Fire Support for Brigade Operations (Light)[14] mention heavy-light operations. These two field manuals contain no TTP recommendations on the use of fire support assets to support these operations.

Table 2.

INHERENT RESPONSIBILITIES OF FIELD ARTILLERY MISSIONS

AN FA UNIT WITH A MISSION OF--	DIRECT SUPPORT	REINFORCING	GENERAL SUPPORT REINFORCING	GENERAL SUPPORT
ANSWERS CFF IN PRIORITY FROM--	1.SPT'D UNIT 2.OWN OBSVR (see Note 1) 3.FORCE FA HQ	1.REIN'D FA 2.OWN OBSVR 3.FORCE FA HQ	1.FORCE FA HQ 2.REIN'D UNIT 3.OWN OBSVR	1.FORCE FA HQ 2.OWN OBSVR
HAS AS ITS ZONE OF FIRE	ZONE OF ACTION OF SPT'D UNIT	ZONE OF ACTION OF REINFORCED FA	ZONE OF ACTION OF SPT'D UNIT TO INCLUDE ZONE OF FIRE OF REIN'D FA UNIT	ZONE OF ACTION OF SUPPORTED UNIT
FURNISHES FIST/FSOs (see Note 2)	PROVIDES TEMP REPLACEMENTS FOR CASUALTIES AS REQ'D	NO REQUIREMENT	NO REQUIREMENT	NO REQUIREMENT
FURNISHES LIAISON OFFICER	NO REQUIREMENT	TO REIN'D FA UNIT HQ	TO REIN'D FA UNIT HQ	NO REQUIREMENT
ESTABLISHES COMMO WITH-	CO/TF FSOs, AND SUPT'D MANEUVER UNIT HQ	REIN'D FA UNIT HQ	REIN FA UNIT HQ	NO REQUIREMENT
IS POSITIONED BY-	DS FA CDR OR FORCE FA HQ	REIN'D FA UNIT OR FORCE FA HQ	FORCE FA HQ OR REIN'D FA HQ, IF APPROVED BY FORCE FA HQ	FORCE FA HQ
HAS ITS FIRES PLANNED BY-	DEVELOPS OWN FIRE PLAN	REIN'D FA UNIT HQ	FORCE FA HQ	FORCE FA HQ

Notes:

1. Own observers includes all target acquisition means not deployed with supported unit (radar, aerial observers, etc).

2. A fire support section (FSE/FSS) for each maneuver brigade/ battalion/cavalry squadron and one FIST for each maneuver company are trained and deployed by the FA unit authorized these assets by TOE. After deployment, FISTs and FSEs remain with the maneuver unit throughout the conflict.

Doctrinal Omissions.

There is a disconnect in the flow from doctrinal manuals to those dealing with TTP that reveals a reduced emphasis on the amount of detail for heavy-light operations. In both the field artillery and maneuver manuals, the reader comes away feeling that the prime fire support problem for commanders is the allocation of a scarce resource, manifested by the creation of the fire plan.

In those TTP manuals that apply to fire support for brigade operations (eg. FM 6-20-40 and FM 6-20-50), no TTP exists to support the heavy-light operation. The maneuver manual containing TTP for maneuver brigades (FM 71-3) also does not adequately address heavy-light operations. This maneuver manual provides no recommendations to the maneuver commander on how to formulate and describe commander's intent for fire support. This guidance is of paramount importance to the commander and to the fire support coordinator for his unit.

Unpublished MMAS Theses and SAMS Monographs.

During the course of reviewing literature for this thesis, the following theses and monographs were of direct assistance in identifying fire support considerations for heavy-light operations:

Light Infantry Augmentation to Heavy Divisional Forces in Europe: A Heavy-Light Primer[15] is an excellent thesis. It

combines depth and detail with the necessary breadth to ensure the reader is conversant with heavy-light operations.

Chapter I provides a perceptive analysis of the recent history of heavy-light concept. It also discusses employment considerations and limitations. When combined with its line diagrams it provides the reader with a broad knowledge of the structure of heavy units and light units, and their use on the modern battlefield.

Chapter II affords the reader several excellent doctrinal sources as well as recent articles, monographs, and theses. The literature is not comprehensively evaluated, however the summary of each article is invaluable in providing the researcher additional reference material.

Chapter III consists of a broad consideration of heavy-light operations viewed from a historical perspective. The casual reader or the military historian will find this chapter's study of heavy-light operations during biblical times innovative and incisive.

From the perspective of this thesis, Poston's Chapter IV - The Doctrine and Employment of Heavy-Light Units, provides the foundation for Chapter 4. Many of the tasks, considerations, and missions that a heavy-light maneuver unit must consider are addressed. However, it did not discuss field artillery considerations for heavy-light operations.

Although not focused on heavy-light operations, The Operational Employment of the Light Infantry Division[16] provides an excellent overview and historical context to light force operations - from World War II through the Falklands War to contemporary thoughts on light force employment. The author cites several appropriate battles where light forces were augmented with heavy fire support with effective results.[17] The purpose of the thesis is to examine the operational employment of the light infantry division in contingency or reinforcement roles. The author's employment considerations were identified through an analysis of doctrine, contemporary military thought, and three historical examples of light infantry engagements.

Articles in Professional Journals.

The concept of heavy-light operations (under its current designation) is a recent evolution in tactics. Its genesis occurred around 1983 with the development of the light infantry division. As with any new concept, doctrine has lagged while units in the field wrestle with how to make the theory work. As a result, many of the best ideas for supporting heavy-light operations with field artillery assets are found in professional articles written by soldiers in field units. After reviewing more than thirty-eight articles, the following six provided the most useful insights into fire support

considerations for heavy-light operations. In some cases the articles were outside the scope of this thesis (heavy-light brigade); however, the lessons and insights apply to this thesis.

Michael A. Hamilton's article, "Heavy-Light Operations,"[18] addresses several salient points that will be further developed in Chapter 4 and 5 of this thesis. First, he discusses the need to "maneuver" fires to support the heavy-light operation. Second, he considers the counterbattery requirements to protect the light force when it conducts an infiltration in support of a heavy operation. Finally, he discusses the differences in targeting priorities, ability to communicate (TACFIRE/non-TACFIRE integration), and the need for SEAD to support air assault operations. This is a good article to provide the reader an overview of fire support considerations. It does not suggest fixes to any of the problems noted.

William W. Hartzog and John D. Howard's article, "Heavy-Light Operations,"[19] is excellent. This article identifies the "desperate need for 'how-to' information"[20] and these authors use their rotational experience at the NTC to provide applicable tactics, techniques and procedures. Consolidation of target lists, use of an integrated fire support execution matrix, employment of target acquisition assets, and accurate tracking of friendly unit locations are some of their most important observations.

"Light Infantry Integration in Central Europe,"[21] by Wayne Downing provides effective insights into the vulnerabilities of the light infantry, the need for the fire support system to protect these units from enemy indirect fires, and the digital communications problems. He also observes the lack of a laser target designator within the light unit's Table of Organization and Equipment (TO&E). He suggests several fixes to redress the TACFIRE problem (give sets of this equipment to the light forces), and the vulnerability problem (provide augmentation from Corps and divisional artillery on an "as-required basis").

Wolf D. Kutter's article, "Deep Behind Enemy Lines,"[22] provides several insights on how fire support can reinforce heavy-light operations. First, he contends that light forces can employ an "indirect approach" using stay-behind and infiltrating forces to attack enemy fuel systems, communications nodes, command and control centers and other high-value targets in the deep battle. Second, he notes the accompanying requirement to accurately track the location of light units to preclude any possibly amicicidal artillery fire missions. Use of restrictive and permissive fire support coordinating measures (FSCM) to ensure rapid engagement of targets while protecting friendly forces is also addressed. Finally, he discusses the SEAD requirements for air assault operations. This article is well researched.

"Heavy-Light Connection: Brigade,"[23] by Jack Wood addresses the need of the light unit to receive timely counterbattery fires to protect it. He also briefly considers the requirement for attacking high-value targets.

Thomas J. Costello wrote an excellent article - "A Counter-fire Concept for Light Divisions." Although focused at the division level, many of the lessons learned relate to brigade heavy-light operations. Major Costello provides an in-depth analysis of the light unit's problems with conducting counterfire missions - from lack of heavy caliber weapons to execute this mission, through communication problems (TACFIRE), to the "how-to" for linking target acquisition radars. While identifying the need to provide these fires to protect light forces, he also provides solutions to this difficult light artillery mission.

Lessons Learned Products.

Several Center for Army Lessons Learned (CALL) bulletins were reviewed. Also reviewed were five Take Home Packages (THP) that were written following heavy-light rotations at the NTC. Rather than synopsize the lengthy lessons learned from these documents, they will be addressed and footnoted in Chapter 4 or 5.

Books and Other Sources.

"Heavy/Light Operations"[24], "Heavy-Light Report"[25] and "Strike Operations: Handbook for the Commander" [26] provide a solid foundation for understanding this unique operation and the fire support considerations when supporting it. Each of these documents fill perceived gaps in doctrine regarding heavy-light operations. They address this operation in a detailed and comprehensive manner.

SUMMARY

Discussion of fire support TTP to support heavy-light operations is conspicuously absent from most current U.S. military doctrine and literature. Heavy-light appendices to doctrinal manuals provide broad principles concerning synchronization of heavy and light forces, but no "how-to" guidelines.[27] None of the doctrinal references reviewed provide fire support TTP to execute synchronized heavy-light operations. In fact, there is no single FM that covers heavy-light operations. There is also no complementary fire support TTP manual on how to support this operation.

Doctrinal manuals for brigade operations provide inadequate TTP to the maneuver commander for conducting heavy-light operations. None of the maneuver field manuals included sufficient TTP to facilitate these operations. FM 6-20 provides excellent doctrine for fire support operations.

However, the fire support TTP manuals (ie. FM 6-20-30, -40, and -50) do not address any facet of heavy-light operations.

Many of the unpublished MMAS theses and SAMS monographs identify the fire support requirements for heavy-light operations. Professional articles were a rich source of TTP and how-to information. The six articles reviewed in this chapter provided in-depth and effective recommendations. The take home packages and CALL bulletins were also pertinent.

ENDNOTES

1. Peter S. Morosoff, "Tactical Manuals: Aids to Thinking," Marine Corps Gazette (September 1986): 48.

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CHAPTER 3

HISTORICAL EXAMPLES

> "I have seen war, and faced modern artillery, and I know what an outrage it is against simple men."[1]
>
> T.M. Kettle, The Ways of War

INTRODUCTION

The purpose of this chapter is to provide a historical foundation for the remainder of this thesis. The intent is not to render a detailed analysis of any battle or campaign. Instead, it will present battles and recent field training exercises (FTXs) to show that heavy-light operations are not a new concept. In fact, these operations are not uncommon. Heavy-light operations do however, require special attention from the aspect of field artillery support.

While discussing these battles, this thesis will also summarize the concomitant field artillery requirements for supporting that heavy-light operation and the attendant need to carefully integrate it with the scheme of maneuver.

This thesis will examine four examples of heavy-light operations and the fire support considerations confronted when supporting these operations. These examples are:

Kwajalein Island (World War II), the Battle of Abu Ageila in 1956 (Arab-Israeli War), Operation JUNCTION CITY (Vietnam) and battles from five NTC heavy-light rotations. In this last example, no single battle will be discussed to preserve the anonymity of rotational units. Rather, this thesis will present a composite picture of how these heavy-light brigades were employed at the NTC and the attendant field artillery considerations for supporting this heavy-light brigade.

World War II

Campaigns throughout World War II are replete with examples of heavy-light operations. In the European Theater of Operations, the 29th and 83d Infantry Division's reduction of German hedgerow defenses through the Bocage using combined arms teams of tanks, infantry, engineers, and artillery provide effective illustrations of heavy-light integration at the battalion level. The indirect fire requirements for these operations are well-documented.[2]

In the Mediterranean Theater of Operations, the 9th Australian Division skillfully executed heavy-light operations against the Afrika Corps in defending Tobruk[3]. This division's integration of infantry units, mechanized and armored forces, and field artillery support enabled their defeat of Rommel's 242 day siege. The 9th Australian Division successfully battled the German 5th Light Armored

Division, along with the Italian 27th Division, 102d Motorized Division, and 132d Armored Division. This accomplishment is especially notable from a field artillery perspective in that the Germans'

> "armaments were superior to Australian weapons in all categories except artillery, where the Australians possessed a marked advantage...The accuracy and efficiency of the artillery... and the discipline of the Australian infantry... had defeated the German blitzkrieg tactics."[4]

By far the best example of fire support considerations for heavy-light operations comes from the Pacific Theater. Here the heavy-light brigade was frequently used to reduce Japanese-held islands. As in the other two Theaters of War, field artillery provided fires focused to disorganize and destroy enemy defenses, as well as to contain and to break up enemy counterattacks. This mission was especially important when heavy forces and light forces were task organized. The artillery came to constitute more and more of the total combat force in support of these operations.[5] By January 1944, the tactics used to conduct amphibious landings were mature and battle-proven. Prior to the assault on Kwajalein Island, the 7th Infantry Division had conducted intensive amphibious training, ensuring "particular attention was given...to the problem of tank-infantry and artillery co-operation."[6] The application of the then-current tank-infantry and artillery tactics, techniques, and procedures

was so successful that following the Kwajalein operation, General Holland Smith wrote

> "In the attack of coral atolls, very few recommendations can be made to improve upon the basic techniques previously recommended and utilized in the Marshalls," (of which the Kwajalein Operation was a part - author) and, "The techniques that had been perfected in the capture of tiny atolls in the Central Pacific proved applicable, and in fact applied, with only minor variations in most of the subsequent island landings..."[7].

On 1 February 1944, the 7th Infantry Division's 184th and 32d Regimental Combat Teams (RCTs) conducted an amphibious assault on the southwestern quarter of Kwajalein Island. Each of these RCTs consisted of (light) infantry units and (heavy) armor units. The preparatory fires on the island were unprecedented in the Pacific in both volume and effectiveness.[8] General Arnold, the division artillery commander, focused the fires of three 105mm howitzer battalions and one 155mm howitzer battalion on the Japanese mortars, 127mm dual purpose cannon emplacements, and forward positions.[9] This counterbattery focus wrecked most of the enemy guns on the western end of Kwajalein Island. The Japanese were never able to employ effective indirect fires as a result.

For the next four days, the 7th Infantry Division fought from one end of the island to the other. During this advance, artillery amicicide caused six casualties in the 184th RCT. This resulted from an incorrect front line trace

sent from Company L, 184th RCT.[10] In spite of these problems, the tanks and infantrymen worked in coordination with the artillery to defeat remnants of the enemy. At night, the artillery fired illumination shells to assist the tanks and infantry in identifying enemy infiltrators. Numerous counter-attacks were broken up using artillery concentrations.[11]

One account of a heavy-light team engagement to reduce an obstacle illustrates the cogent points of this battle

> "The tanks of Company A, 767th Tank Battalion, lined up along Carl Road to fire against the strong point, while those from Company B took positions almost at right angles to that road and prepared to strike the enemy from the left flank during the first stage of the attack. One of the batteries on Carlson [Island] continued to fire during the infantry advance, and the Cannon Company's howitzer's also laid a preparation on the target area. Then, while the artillery lifted fire to the ground northeast of the target, the tanks and infantry approached the tank trap in a 225-yard advance across open ground. The tanks poured machine gun fire into the area. Thirty yards behind them the troops came forward to the shelter of the tank ditch without receiving an enemy shot. The Japanese were pinned down by the combined fires of tanks, infantry, and artillery."[12]

This vignette illustrates a battle where heavy-light units executed a mature doctrine based upon lessons learned during the course of the war in the Pacific. As General Holland Smith stated, "the techniques...had been perfected" at this point of the war. These techniques include:

1. Focusing counterbattery fires onto enemy indirect systems to protect the friendly light infantry.

2. Maintaining an accurate front line trace to preclude fire missions executed on friendly troops.

3. Using high-volume, accurate, artillery fires to protect the light forces and isolating the objective from enemy counterattacks.

Arab-Israeli War - 1956

The Arab states and the Jewish people have fought one another since the formation of the state of Israel in 1947. These wars began in 1948 and have flared up intermittently in 1956, 1967, and 1973.[13] The Israeli military response in each of these actions reflect a combined arms approach to task organization. The intent of this approach is to afford the commander maximum flexibility and combat power. He can tailor his force based upon the factors of METT-T.[14]

The Arab-Israeli Wars of 1956, 1967, and 1973 each provide excellent examples of heavy and light forces conducting operations in a heavy-light configuration. This thesis will examine the employment of the 7th Armored Brigade in the Battle of Abu Ageila on the Sinai Peninsula in 1956. The tempo of this battle, the Israeli employment of a task organized heavy-light brigade, and the lessons learned with the respect to difficulties and successes that the unit experienced employing artillery assets, provide germane examples within the context of this thesis.

The events leading to the Battle of Abu Ageila began on 29 October 1956, when Israel launched OPERATION KADESH. This operation consisted of a parachute insertion into the western side of the Sinai Peninsula followed by a link-up with land forces from the east. The 7th Armored Brigade constituted a portion of this operation. The brigade was task organized as shown in Fig. 7 with heavy and light forces.[15]

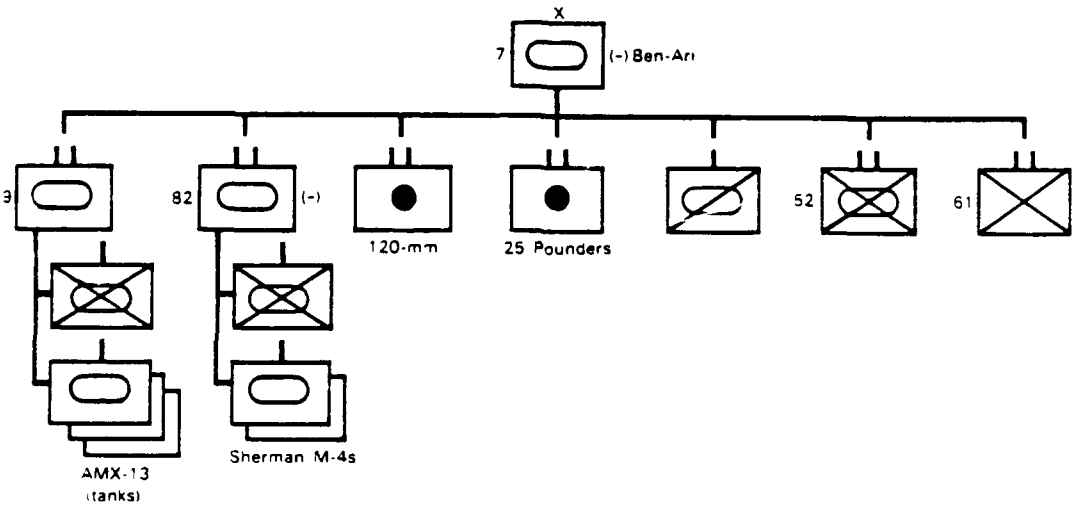

Fig. 7. Organization of the 7th Armored Brigade

The 7th Armored Brigade began moving west on the 30th. By 31 October, the brigade had cleared through Daika Pass (south of Abu Ageila). At the behest of his *Ugdah* (a division-size task group)[16] commander, Colonel Ben-Ari initiated movement north from the Pass. His mission was to assault Egyptian positions at Raufa Dam and continue northward to Abu Ageila.

Egyptian defenses at Abu Ageila are characterized as a "hedgehog." This defense is characterized as a strongpoint consisting of concentric lines. The aim of this system was to have as many mutually supporting defensive systems as possible.[17] The hedgehog incorporated three successive sand ridges with barbed wire and minefields in front. Behind this stood a network of trenches and sandbagged bunkers with infantry and antitank systems. By using the obstacles to slow down the attacking forces, the Egyptian antitank guns, infantry, and artillery effectively engaged Israeli forces.[18]

The Egyptians defended Raufa Dam and nearby Abu Ageila with two Egyptian brigades, the 6th Infantry Brigade and the 99th Infantry Reserve Brigade. Two squadrons of tanks, an artillery regiment, antitank guns, and a small unit of jeeps supported the defenses established by these two brigades.[19]

Due to the lack of artillery and mortar smoke munitions available, Colonel Ben-Ari had difficulty in synchronizing his artillery to support his light infantry. He decided to infiltrate his light infantry into the trench system in darkness to overcome this defense and its defenders by,

> "walking slowly and in absolute silence until fired upon. When discovered, they ran forward as fast as possible, firing on the move, while barbed-wire fences were breached by bangalore torpedoes. On reaching the trench line, the men split into small assault groups, and without pausing to clear the fire trenches, burst into the communication

> trenches, shooting...until all the defenders were captured or killed."[20]

To reduce the vulnerability of the light force clearing the trenches from enemy counterattack, Colonel Ben-Ari isolated the strongpoint using artillery fires.

Once the tanks began their assault, the artillery fired missions to suppress the Egyptian antitank guns. This worked effectively until the fires were shifted onto a fortified position. Because the field artillery scheme of fires had not been synchronized with the infantry and armor scheme of maneuver, the commander did not focus on suppressing the Egyptian antitank guns. As the field artillery fires shifted, the antitank guns began to engage Israeli tanks from the flank. The Israelis lost seven tanks within ten minutes.[21] A platoon leader radioed the artillery battalion and again focused the field artillery fires onto the antitank guns. The 7th Armored Brigade suffered no further losses from those guns.

As the brigade continued forward, the Egyptian artillery began to make itself felt on the attackers. Several Israeli batteries went into action "seeking the enemy gun positions," but they failed. The Israelis could not effectively estimate the location of the Egyptian artillery.[22]

By late morning of 1 November, the *Ugdah* commander instructed the bulk of the 7th Armored Brigade to continue its advance west toward the Suez Canal. Its light infantry

battalion was transferred to the control of another brigade to complete operations at Abu Ageila. The Israelis planned to complete the encirclement and starve the remaining defenders into submission.[23] The 'Hundred-Hour War'[24] ended with the starving Egyptian forces infiltrating back toward the Suez Canal.

The Battle of Abu Ageila illustrates graphically the successes and difficulties the field artillery experienced in applying the tactics, techniques and procedures for a heavy-light operation. Among the Israeli difficulties were:

1. Troop locations (especially dismounted troops) were not accurately maintained to preclude amicicidal missions. At least one Israeli soldier was killed as a result.

2. Ineffective counterfire missions to protect the light forces from Egyptian indirect fire systems.

3. The failure to plan suppression missions to support a dismounted infantry infiltration if they were discovered.

4. The field artillery fire plan was not coordinated with the heavy-light rate of movement. This resulted in fires shifted from the critical point on the battlefield to one less decisive. (The primary source did not overtly state this; however, secondary sources indicate this is occurred.)

5. The field artillery and mortars lacked the smoke munitions to obscure the movement of the light forces. The

result was the commander had to move infiltrate these light forces in darkness to provide them the requisite protection.

Among the Israeli successes with field artillery are:

1. Effectively isolated the strongpoint defense to preclude Egyptian counterattacks.

2. Initially employed effective suppression on antitank guns.

3. Although the field artillery did not provide adequate smoke during breaching operations and movement of the light forces, fires were focused on the far side of the obstacle to suppress Egyptian defenders. This suppression protected the light infantry breaching team from Egyptian direct fire systems.

Vietnam

The generally unsuccessful experience of French armored forces from the end to World War II to 1954 convinced the U.S. military that armored units could not be employed in Vietnam.[25] Thus, as late as 1965, when the U.S. Army began to send combat units to Vietnam, most military planners considered the Vietnam War an infantry and Special Forces fight; they saw no place for mechanized and armored units. It was not until late 1966 (with a study titled Mechanized and Armor Combat Operations, Vietnam) that top military

leaders recognized the necessity of integrated heavy (eg. tanks and mechanized infantry) and light (eg. infantry) operations.

One of the first operations planned and executed following the release of this study was Operation JUNCTION CITY. Committed to this operation were the 1st Infantry Division (Mechanized) and 25th Infantry Division. In addition, the operation included six separate brigades: the 173d Airborne, 196th Light Infantry, the 199th Light Infantry, 3d Brigade, 4th Division, the 1st Brigade, 9th Division, and the 11th Armored Cavalry Regiment.[26] This thesis will focus on the 3d Brigade of the 1st Infantry Division (Mechanized) to provide the salient points of the operation.

Of the many engagements that took place during this operation, the Battle of Prek Klok is representative.[27] The forces used during Operation JUNCTION CITY, and specifically, this battle consisted of heavy and light forces task organized into formations that today would be called "heavy-light." The 3d Brigade, 1st Infantry Division (Mechanized) was task organized with "one infantry battalion and two mechanized task forces."[28]

On 23 February 1967, the 3d Brigade began establishing a blocking position along the Prek Klok River in northwestern War Zone C, to support the larger II Field Force concept.

The Viet Cong's (VC) resistance stiffened as these operations restricted his freedom of maneuver and interdicted his supply routes. To relieve this pressure, the VC attacked Fire Support Base (FSB) II at Prek Klok on 10 March. This FSB was defended by one of 3d Brigade's mechanized infantry battalions augmented with dismounted infantry, engineers, and two batteries of 105mm howitzers. The light and heavy forces provided mutual support to one another as

> "Tracked vehicles were placed around the perimeter at 50-meter intervals, and...infantrymen manned foxholes between the APC's."[29]

At 2100 hours, the VC began firing mortar shells into the FSB. More than 200 rounds were fired. Fire Support Base Gold (a nearby FSB), reoriented its howitzers onto this new direction of attack and initiated counterfires to "seek out the enemy mortars that were pounding the defenders."[30] The intent was to neutralize the enemy mortar fires affecting the light forces as they provided mutual support to the mechanized units. By 2135 hours, the enemy barrage ended - the FSB II received no more incoming mortar (82mm) rounds.

At 2220 hours, the VC launched its main attack with two battalions. For the next fifty minutes continuous artillery fires fell on the enemy. On six occasions indirect fires were adjusted to within fifty meters of dug-in positions.[31] At times, these close-in fires stripped enemy attackers from the armored vehicles.

The battle of Prek Klok was one-sided, as the enemy lost almost 200 men while the defenders lost three. "A combined arms team of artillerymen, mechanized infantrymen, infantry, and engineers ...had dealt him a severe blow."[32] The morning after the fight, Brigadier General Bernard Rogers walked among the defenders and asked one soldier, "What did you think of the artillery - was it coming in a little close?" The soldier replied: "Sir, I was getting sprayed all over. But, God, it felt good."[33]

As stated, the Battle of Prek Klok exemplifies many other battles that occurred in Vietnam. Close integration of heavy and light forces entailed special considerations for the field artillery. The successful tactics, techniques and procedures include:

1. Focusing fires on enemy indirect systems to protect the light infantry as they provided mutual support to the mechanized units.

2. Maintaining an accurate front line trace to avoid amicicidal field artillery fire missions.

This battle also illustrates the flexibility of the field artillery to support heavy-light operations over a large territory without a defined "front line." This difficulty is not unusual when conducting heavy-light operations - the light infantry may shape the battlefield in a non-linear pattern. Formerly, the field artillery had

oriented its support towards a particular front line or axis of advance. By contrast, in Vietnam it had to operate on an area concept, providing fires in any direction. This was graphically illustrated when Fire Support Base Gold relaid its howitzers onto a new direction to conduct the counter-fire missions that were essential to protecting the 3d Brigade from the Viet Cong indirect fire systems. This area concept of fire support is in keeping with the focus of AirLand Battle Future concepts of nonlinear battlefields.

National Training Center Heavy-Light Rotations

The National Training Center, located at Fort Irwin, California, is a 1000 square mile tract of high desert. It has more than 600,000 acres of essentially unrestricted maneuver space, extensive live fire ranges, and a sophisticated instrumentation system to track the exercises. Its mission is to provide tough, realistic, multi-echelon combined arms and services joint training for heavy brigades and their slice of support. The intent is to prepare heavy units for war.[34]

Units maneuver on a rigorous, changing battlefield against a thinking enemy or opposing force (OPFOR). This battlefield is characterized by increased lethality from direct and indirect fire weapons, increased geographic areas of responsibility, and challenging problems in command,

control, and synchronization. Units rotating to the NTC train in a continuous series of engagement simulation exercises (ESX) against an OPFOR, and live fire exercises (LFX) against target arrays replicating a sophisticated enemy such as the Soviet army.[35]

In 1988, as a result of a joint Fort Benning and Fort Knox initiative, the NTC began to conduct heavy-light operations. Tactical scenarios and exercises were used to identify the capabilities of these new units. Once evaluated by units in the field, the proponent schools began to publish doctrinal manuals to recommend methods to employ fighting vehicles, tanks, and light infantry together and independently.[36] These doctrinal manuals were addressed in Chapter 2 of this thesis.

From January 1988 through June 1990 there have been eight heavy-light rotations at the NTC. The long-range FORSCOM exercise plan projects four or five heavy-light rotations (of the fourteen rotations scheduled annually) for fiscal years 1991 and 1992. This thesis examined five heavy-light rotations from 1988 through 1990.

The results of this analysis provide insights into likely use of heavy and light forces in a mid- to high-intensity conflict.[37] The following scenarios are based upon these five rotations and present a composite picture of how these

forces were employed. They represent how heavy and light units were employed in an offensive and a defensive battle.

Offensive Employment

Most frequently the light battalion is employed in a manner corresponding to the Soviet army use of a forward detachment. This means that the light force infiltrates to seize key terrain that will facilitate the forward passage of a heavy unit. Once the objective is seized, the heavy unit passes through the light unit and continues the mission to the final objective.

A variation of this tactic is to use the light unit as the Soviet army uses an advance guard for the main body. As the advance guard, the light force infiltrates forward to kill a portion of the enemy that may adversely affect the heavy movement. Again, the heavy unit moves through the light unit once the threat has been neutralized.

During offensive heavy-light operations, the light force may also conduct an air assault mission that accomplishes one of the above tasks.

The final use of light infantry is to employ them as a reconnaissance force to locate enemy elements that are on the axis of the brigade's main attack. Once identified, they employ the heavy brigade's fire support means to destroy this threat.

Defensive Employment

The majority of the defensive missions employed one of two tactical maneuvers. This is not to say there are not other tactics; rather, the NTC Take Home Packages (THPs) for these heavy-light rotations simply did not utilize the light forces in any other manner.

The first is to shape the battlefield by placing the light force in a defense on restrictive terrain. If the enemy used this avenue, the light battalion used the advantages of terrain, the defender, and its antitank systems to divert the enemy into an engagement area covered by heavy forces with rapid firing antiarmor systems.

The second tactic used to employ the light battalion in brigade heavy-light operations is to use it as a counter-reconnaissance force to destroy the enemy's reconnaissance forces.

Fire Support Observations

The following observations reflect comments from eight heavy-light rotations. These NTC THPs note the following considerations that are specific to heavy-light operations:

1. For defensive or offensive employment, an over-riding field artillery consideration must be protection of the light force from enemy indirect fire systems.[38]

2. The fire plan must synchronize fire support assets to support the scheme of maneuver. This is more difficult during heavy-light operations due to the disparity in mobility and speed between the heavy and light forces. Just as combat forces maneuver on the battlefield, so also the field artillery must maneuver its fires. The NTC THPs from eight heavy-light rotations maintain that the field artillery accomplishes this using two techniques: movement of the firing units, and shifting of fires. Both techniques must be used together.[39]

3. The friendly artillery must accurately track the location of the light units as they move about the battlefield. This is most important during heavy-light operations to preclude field artillery amicicide on light forces as they have no armor protection and are extremely vulnerable to indirect fires.

4. Other heavy-light fire support techniques stressed in the THPs include the following -

a. The requirement to provide adequate smoke that obscures the light force.

b. The importance of providing suppressive fires to support light infiltrations.

c. The use of field artillery and mortar fires to protect the light force by isolating the objective from enemy counterattacks.

d. The need to consider the difference in mobility and speed of the heavy and light forces. These movement rates must be considered in the fire plan.

e. Coordination of communication procedures.

Summary of Historical Heavy-Light Fire Support Considerations

As this chapter has illustrated, heavy-light operations from World War II to present are not a new concept. However, this mission entails special considerations from the aspect of field artillery support.

The common fire support threads that run through each of these conflicts when executing a heavy-light mission are:

1. A higher reliance on counterfires to protect the light (dismounted) infantry from enemy indirect fires.

2. The necessity to accurately track the location of the light infantry to preclude amicicidal fires.

3. The requirement to synchronize field artillery fires to support the movement of forces that move at differing speeds and on differing terrain.

4. The need to provide smoke and suppressive fires to conceal the light force and provide it protection from enemy counterattacks.

5. Recently, the communications methods and equipment between the heavy and light forces have diverged and require special considerations to ensure each can communicate with the other.

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CHAPTER 4

TACTICAL CONSIDERATIONS

> "War makes extremely heavy demands on the soldier's strength and nerves. For this reason make heavy demands on your men in peacetime exercises."
>
> Field Marshall Erwin Rommel[1]

INTRODUCTION

Chapter 1 introduced heavy-light operations and described the inherent capabilities and limitations of heavy and light units. It also demonstrated that by task organizing to perform heavy-light operations, heavy and light units offset one another's limitations and reinforce strengths. The review of literature in Chapter 2 determined that U.S. Army tactical fire support doctrine for heavy-light operations is adequate. However, current field manuals (FMs) or their annexes provide limited fire support tactics, techniques, and procedures (TTP) to support the heavy-light brigade's mission. Chapter 3 demonstrated historically that heavy-light operations are not a new concept. It also outlined many of the essential fire support TTP developed during battles and exercises from World War II to present to support a heavy-light brigade.

The intent of this chapter is to consolidate and present critical field artillery tactics, techniques, and procedures that support brigade heavy-light operations. By doing so, a heavy-light brigade commander and his FSCOORD can use these TTP to facilitate the brigade's heavy-light operation. Many, while applicable to all operations, have special significance during heavy-light operations. None of these commonly accepted practices have been captured in any single document pertaining to heavy-light operations.

Field Artillery Tactics, Techniques, and Procedures for Brigade Heavy-Light Operations

The tactics and techniques this chapter addresses deal with protecting dismounted and light infantry soldiers, and movement and positioning of field artillery firing batteries to support the heavy-light operation. This chapter will also recommend six procedures to enhance field artillery responsiveness when supporting a heavy-light operation. These procedures include: design of control measures and fire support coordination measures (FSCM); timely and accurate location reporting; consolidation and distribution of the fire support plan before the operation begins; heavy-light fire support rehearsals; use of an integrated fire support execution matrix to synchronize fires with heavy-light maneuver, and modifications to the heavy brigade direct support field artillery battalion's unit basic load (UBL).

Issue I. Protection of the Force.

Discussion. The light infantry battalion is extremely vulnerable to enemy indirect fires. When the light infantry conducts an infiltration or a stay-behind mission, the field artillery can protect this force by using its attached AN/TPQ-36 FIREFINDER radar. The following are two techniques to provide this protection.

The first technique is to establish a critical friendly zone (CFZ) into the radar's computer. In essence, the CFZ is a friendly area into which the maneuver commander does not want enemy indirect fires to impact. By designating a CFZ, the FIREFINDER generates an immediate call for fire onto any hostile indirect fire system the computer predicts will impact into the CFZ.

Establishing a priority zone (PZ) is a second technique to rapidly engage enemy artillery fires. The PZ is an area within the enemy's area from which any fires must be quickly neutralized. Again, the FIREFINDER generates an immediate call for fire onto hostile artillery systems from that zone.

If the maneuver commander uses these techniques, the field artillery can provide rapid, responsive fires to protect the light force. Since the computer associated with the FIREFINDER can only store nine zones, the commander and his FSCOORD must carefully analyze where and when to establish these measures. The CFZ or PZ is limited in range

only by the capability of the Q36 radar (approximately 24 kilometers).

Recommendation. To protect the light battalion from an attack by enemy indirect fire systems, a heavy brigade identified to conduct heavy-light operations must ensure its task organization includes a Q36 FIREFINDER radar. The brigade commander and the FSCOORD must then carefully consider assigning CFZs or PZs to the light battalion when and where an attack by enemy indirect fire systems may influence their freedom of action. The field artillery battalion can execute a counterbattery program to attack those enemy indirect fire systems that may affect the heavy-light brigade's scheme of maneuver. By rapidly engaging these enemy systems, the heavy-light brigade can enhance the survivability of the light unit.

Issue II. Positioning and Movement of Firing Units.

Discussion. During heavy-light operations it is critical that the brigade receive timely fires to protect and conceal the force. A doctrinal task for the field artillery discussed in FM 6-20, Fire Support in the AirLand Battle is support of maneuver forces in contact.[2] Field artillery supports these forces by performing its roles of close support, counterfire, and interdiction. The key to providing effective fires in support of heavy-light forces is to keep

fire support assets in range and responsive to the maneuver force. This task is complex due to the extended range of operations, the differing movement speeds of heavy versus light units, and the possible presence of forward deployed light forces. Displacement criteria must be established for firing units by phase of the battle. Positioning and movement of firing units must be tied to the movement of maneuver forces and decision points. Movement of fire support assets must be closely monitored to support heavy or light forces that are beyond the main battle area. If light forces conduct operations too far from the heavy brigade they are augmenting, the direct support battalion may not be able to adequately support both heavy and light force operations.

Recommendation. An effective tactic to support a heavy-light brigade is to begin movement of firing assets when the heavy or light force reaches one half the maximum range of the field artillery weapon.[3] To maintain continuous fires, one proven tactic is to echelon firing elements. This involves moving a battery (or platoon) forward while maintaining the other firing units' ability to respond to calls for fire. Once the moving unit is in position and ready to fire, the next firing unit is then moved to a new firing position. This echeloning tactic is also applicable to movement of Q36 FIREFINDER radars, if more than one is available. This ensures that both the light force that is

operating forward and the heavy force that is beginning movement have adequate fire support.

If the heavy brigade conducts deep operations with light forces beyond the range of the field artillery, the brigade commander has four options. He may have to modify the plan, displace the field artillery to support the operation, try to integrate other fire support means to protect the light force or accept risk with the light force. Without fires to protect them, the light force may face unacceptable risks.

Issue III. Procedures to Facilitate Field Artillery Responsiveness to the Heavy-Light Brigade.

Discussion. Chapter 3 noted that often the light unit begins conducting its mission before movement of the heavy unit. When a heavy-light brigade employs this tactic, it is important to consider several procedures to enhance field artillery responsiveness when light and heavy forces are separated on the battlefield.

These procedures, while applicable to all operations, have special significance during brigade heavy-light operations. They include (1) carefully designing and establishing control measures and FSCM to support the brigade heavy-light operation, (2) establishing reporting procedures, and (3) finalizing and distributing the fire plan before the light unit or heavy unit begin combat operations. Other critical TTP include (4) conducting heavy-light rehearsals

that synchronize fire support with maneuver, (5) developing an integrated heavy unit and light unit fire support execution matrix and (6) modifying the direct support field artillery battalion's basic load of ammunition to support both heavy and light force requirements.

(1) Designing control measures and FSCM.

The heavy and light commanders, along with input from their FSCOORDs, must exercise greater care when developing control measures and FSCM to control a brigade heavy-light operation.

Properly designed restrictive fire support coordination measures protect observation posts (OPs) and light units that are operating beyond the forward edge of the battle area (FEBA). A proven procedure to protect stay-behind or forward operating light units is to establish a NFA around their position. The FSCOORD in concert with the maneuver commander determines the effective date-time group that the NFA becomes active and when it is canceled. This minimizes the impact the FSCM has on the execution of fires and provides protection to the stay-behind or forward operating light unit during the time it occupies the NFA.

The coordinated fire line (CFL), a permissive FSCM, expedites attacking targets beyond it by conventional surface fires. By carefully designing it, the brigade commander and FSCOORD can assure the light battalion of rapid

engagement of enemy forces affecting the light mission - especially those targets that are beyond the range of the light battalion's 60mm mortars.

(2) Reporting procedures.

Accurate and timely reporting of friendly unit locations assists the brigade commander and his FSCOORD in providing fire support. Accurate reporting precludes amicicide and allows the FSCOORD to maintain continuous fire support to the heavy and light forces. A successful procedure to provide this timely reporting in heavy-light operations is for the light unit to report changes to its location every fifteen to thirty minutes or half a kilometer.

(3) Finalizing and distributing the fire plan before the light unit or heavy unit begins combat operations.

Often the light battalion deploys early to allow heavy and light forces to close on the objective simultaneously. The fire plan and target list must be finalized and distributed to all maneuver forces prior to the light force deployment. If the fires are not synchronized with the light battalion's maneuver, they may not support the heavy-light brigade commander's scheme of maneuver or intent.

To ensure a completed and consolidated fire plan is distributed to units within the heavy-light brigade, an effective procedure is to establish a cutoff time for changes. This is frequently established as five to six hours

before any portion of the operation begins.[4] Once the fire plan is finalized, changes are restricted to those that are approved by the commander or his FSCOORD.

(4) Heavy-light rehearsals[5]

Rehearsals are a means of reducing some of the friction during brigade heavy-light operations. Rehearsals phase the application of combat multipliers so they support the heavy and light forces with the critical asset at the proper time. The rehearsal should practice the plan. It is critical for the heavy-light rehearsal to validate fire support command and control procedures, as well as fire support communications. Problems noted during the rehearsal should be resolved before principals leave the rehearsal site.

Following a brigade heavy-light rehearsal, the heavy and light battalion commanders, as well as their fire support personnel, should understand the concept of fire support for the heavy-light operation. Each should know during what phase of the operation they have priority of fires, what event will trigger this priority and where, what fires are available to their heavy or light force, and how the commander envisions field artillery fires complementing the scheme of maneuver.

The commander's concept of fire support, developed during wargaming, is the key to the heavy-light fire support

rehearsal. It focuses the staff on the commander's plan for fighting the battle.

(5) An integrated heavy-light fire support execution matrix (FSEM).

The fire support execution matrix must be developed together by the heavy and light battalion FSCOORDs. The FSEM captures the results of the synchronization effort and provides a visual record that ensures effective application of fire support assets to support the heavy-light operation.

The focus of indirect fires will change as the battle unfolds. Initially fires may be at extended ranges to disrupt enemy forces and force him to deploy early. Later, the field artillery may execute fires to mask the noise of light units as they infiltrate into their objective area. As the battle continues, the focus may again change to counterbattery fires to protect a light force as it conducts a deep mission to facilitate the heavy brigade's mission. A later phase may focus on close fires to disrupt the enemy's armored formations.[6]

As the heavy-light brigade commander focuses artillery fires by phases of the battle, the FSEM captures his requirements for each phase. The FSEM links responsibility for engaging a specific target to a forward observer or fire support team and a delivery system. This ensures the light commander knows which targets he will attack and which the

heavy commander will attack. By assigning responsibility for specific targets, the FSEM eliminates redundancy and ensures all targets are attacked according to the commander's intent.

The FSEM will also phase activation and cancellation of the fire support coordination measures previously discussed. This ensures adequate protection to the light forces in the form of restrictive FSCM, while providing continuous fire support to the heavy-light brigade using permissive FSCM.

(6) Modifying the field artillery battalion's basic load.

During heavy-light operations, the heavy brigade will require additional high-explosive (HE), smoke (HC/WP), and illumination ammunition. These changes reflect the differing needs of the light battalion when it augments a heavy brigade. HE is less hazardous to use close to unprotected soldiers than is DPICM; HC/WP affords concealment to light forces; and illumination provides navigation aid, as well as vision at night.

The preponderance (65-85%) of ammunition within most direct support field artillery battalions is dual-purpose improved conventional munitions (DPICM). DPICM consists of bomblets that create hazards when fired close to unprotected troops, such as light infantry. Conversely, HE munitions provide more effective close-in fires without the hazard created with DPICM bomblets but only accounts for 5-10% of a

UBL. A heavy brigade augmented with a light battalion should plan to modify its direct support field artillery battalion s UBL to reflect an increase in HE ammunition.

During heavy-light operations the light battalion also requires an increase in smoke ammunition. Smoke is used to obscure the location of the light unit as it conducts operations. Smoke and illumination may also be used to assist the dismounted forces in navigating to a deep objective.

Summary of Critical Tactics, Techniques and Procedures for Brigade Heavy-Light Operations

The intent of this chapter is to capture the critical TTP developed in combat and field training exercises that are pertinent to brigade heavy-light operations. These TTP include techniques to provide protection to light forces through counterbattery fires. By carefully designing critical friendly zones and priority zones, the heavy-light brigade can substantially improve the survivability of the light battalion.

A tactic addressed was positioning and movement of field artillery firing units to provide continuous fire support to the maneuver force. During heavy-light brigade operations, this is difficult due to the differing speed of the units, their specific fire support needs, and movement plan of the field artillery battalion. The FSCOORD must use such tactics

as displacement by echelon or battery to maintain continuous fire support for the heavy-light maneuver force.

This chapter notes six critical procedures to enhance field artillery support to a heavy-light operation. These include the following procedures: (1) The maneuver commander in concert with his FSCOORD must design control measures and fire support coordination measures in a manner to facilitate execution of fires while providing requisite protection to maneuver forces as a whole. (2) Units conducting combat operations must report their locations accurately and in a timely manner. (3) The completed fire plan must be consolidated and distributed prior to movement of the light unit or the heavy unit. (4) Fire support must be integrated into rehearsals conducted by the heavy-light brigade. (5) A joint fire support execution matrix must be completed prior to initiation of the heavy-light operation to synchronize fires with maneuver. (6) The UBL of the heavy-light brigade's field artillery battalion must be modified with an increase in HE and smoke, and possibly illumination ammunition.

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1. Erwin Rommel, ATTACKS, (Provo, Utah: Athena Press, Inc., 1979): 8.

2. U.S. Army, FM 6-20, Fire Support in the AirLand Battle, (Washington DC: Department of the Army, May 1988): 1-3.

3. U.S. Army, "Strike Operations: Handbook for Commanders," Draft, Unedited (Fort Leavenworth, KS: US Army Command and General Staff College - CTAC, 1990): 5-30 through 5-33.

4. U.S. Army Operations Group, "Take Home Package 90-06: Brigade Missions," (Fort Irwin CA: NTC Operations Group, 1990): III-C1-1 through III-C1-3. See also: Take Home Package 90-08 and 90-09, Part III, Annex C1. (Also based upon data collected at the National Training Center using the United States Field Artillery School (USAFAS) data collection instrument from 11 July 1988 through 15 February 1989.

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6. "Strike Operations," 5-34.

CHAPTER 5

COMMUNICATIONS

> "If intercommunication between events in front and ideas behind are not maintained, then two battles will be fought - a mythical headquarters battle and an actual front-line one, in which case the real enemy is to be found in our own headquarters...this is one [lesson] which cannot be controverted."
>
> Major General J.F.C. Fuller[1]

INTRODUCTION

To conduct operations units must be able to communicate. Operations among such disparate forces as heavy units and light units require these communications to be timely and reliable. This chapter will address the critical communications factors these forces must consider when executing heavy-light operations.

Within this context, the following elements affect fire support communications within the brigade while it conducts heavy-light operations. These are the limited range of the light battalion's communications systems, the lack of redundancy in these communications systems,[2] integration of TACFIRE/non-TACFIRE fire request channels,[3] and secure equipment compatibility. Each of these elements present a

unique challenge that the heavy-light brigade commander and his direct support field artillery battalion commander (FSCOORD) must recognize and allocate resources to redress.

The TTP that follow will assist the brigade commander and the FSCOORD to ensure communications problems do not interrupt fires from supporting the scheme of maneuver.

Communications Tactics, Techniques and Procedures for Heavy-Light Brigade Operations

The primary means of communication for a light platoon or company forward observer (FO) or fire support team (FIST) is the PRC-77 radio. The range of this radio is roughly 8 kilometers. Since it is not unusual for a field artillery battalion tactical operations center (TOC) to emplace 4 to 7 kilometers from the front line of own troops (FLOT), this may significantly limit the ability of the field artillery battalion to receive radio-originated calls for fire from light units equipped with the PRC-77.

There are several techniques a heavy-light brigade may employ to overcome this problem. These include (1) siting the field artillery retransmission station dedicated to relaying voice calls for fire to the field artillery TOC, (2) using the brigade's organic retransmission station to relay the call for fire, (3) emplacing a firing battery forward to receive the call for fire and either relaying the call to the TOC or initiating a fire mission based upon the call, and (4)

using directional antennas to reduce the limitations of the PRC-77 radio. Except for using directional antennas, each of these solutions require the brigade to redistribute limited assets to complement the heavy-light mission.

1. Using the field artillery battalion's retransmission station to relay a voice call for fire requires careful positioning to provide the maximum support for the light unit. This technique requires the battalion communications and electronic staff officer (CESO) to tactically locate the retransmission station on terrain that supports the mission while enhancing survivability of the system. The disadvantage of this technique is the loss of the station to fulfill other missions for the field artillery battalion.

2. Using a brigade retransmission station to relay light force calls for fire to the field artillery battalion is another technique. In certain situations, the brigade may provide its retransmission station to the light battalion. Although unlikely, the factors of METT-T may dictate this occur. This incurs the same advantages and disadvantages for the brigade as it would for the field artillery battalion providing the equipment to the light force.

3. Emplacing a field artillery battery forward to receive calls for fire and relay the request or execute the fire mission is another technique to provide continuous fire support to the light unit. If the brigade commander and the

FSCOORD decide the light force must have immediately responsive fire support, the firing battery can execute timely fire support to the light force. However, massing fires is difficult and the battery may become subject to enemy counterbattery fires. The battery may also become overwhelmed with fire missions, or not be able to support other portions of the brigade's mission.

4. Using directional antennas, such as the OE-303, will provide additional range for the PRC-77. The primary disadvantage is they are best used while the light force is in a stationary position.

TACFIRE/non-TACFIRE Communications.

Frequently units conducting heavy-light operations experience problems integrating TACFIRE/non-TACFIRE radio nets.[4] This is caused by the lack of digital fire control equipment within the light units.[5] When a TACFIRE-equipped unit supports a non-TACFIRE unit, the problem of mixing voice fire missions and digital fire missions on the same fire support net arises.

Digital technical fire control processes digital fire missions in a more timely manner and results in more accurate engagements and sheafing around the target than a voice system with manual computation of firing data.[6] Digital technical fire control will also allow the light unit to

interface with heavy field artillery units and other reinforcing artillery that is TACFIRE equipped.

Until the light units are completely fielded with digital communications capability, the following four techniques can successfully overcome the problem of TACFIRE/ non-TACFIRE integration.

First, the heavy unit can design a net architecture to receive voice calls for fire and then input these calls into the TACFIRE computer. The field artillery battalion may have to modify its net architecture to receive voice calls for fire. Most field artillery battalions operate with two internal voice nets (one for command and control, the other for fire support coordination) and three internal digital nets (fire direction nets). This architecture is designed to support a communications system that relies primarily on digital traffic. When field artillery battalions must support voice and digital traffic, one net cannot manage fire support coordination, calls for fire, fire orders, and messages to observers. This net cannot manage voice and digital traffic simultaneously.

Concurrently, the three digital fire direction nets are not fully utilized. Voice operations require more nets than digital operations, and the Communications and Electronic Staff Officer (CESO) can change the net structure and reassign frequencies to support the communications means

being used. The CESO must also coordinate Signal Operating Instructions (SOIs), and DMD destination and initialization codes. The automated (digital) unit must rehearse this technique to ensure it issues correct voice fire orders, fire commands, and messages to observers.[7]

A second technique is for the heavy unit to provide a liaison team with a variable format message entry device (VFMED) or when fielded, a Brief Case Terminal (BCT). This allows the light unit to conduct digital fire planning and limited digital calls for fire. The liaison team from the heavy unit can provide a VFMED or a BCT and its expertise to assist the light battalion in planning and executing digital communications. Whether or not the liaison team has a VFMED or a BCT, this team should accomplish the following duties when supporting the light unit:[8]

(a) Establish communications with the TACFIRE unit (by radio and/or wire) to support the light unit.

(b) Establish a quick fire channel as required to support operations.

(c) Report information on the tactical situation, plans, and pending operations of the light unit to the field artillery battalion.

(d) Inform the light battalion of the location and operational status of critical elements of the field artillery battalion.

(e) Process digital calls for fire (FM;RFAF) to the TACFIRE computer.

(f) Process requests for combat information and pass combat intelligence between the light unit, the maneuver brigade, and the field artillery battalion, such as artillery combat intelligence (ATI;CBTI) and shell reports (ATI;SHR).

(g) Enter the Command Fire 2 (CF 2) or field artillery battalion operations fire radio net to establish the voice and/or digital link between the light battalion and the field artillery battalion to pass requisite information.

(h) During TACFIRE/non-TACFIRE operations, the principal fire planning consideration is to exploit the TACFIRE's automated fire planning capabilities.

Third, the heavy brigade can provide its combat observation lasing team (COLT) to the light unit to reinforce the light battalion's observation of the battlefield. These observers are equipped with organic digital communications capabilities.

Finally, a unit can use a combination of these techniques. The heavy brigade can augment the light battalion with its COLT to provide digital communication and/or thicken the critical point on the battlefield with observation.[9] The COLT is equipped with a DMD and a ground/vehicular laser locator designator (G/VLLD). The DMD provides access to the field artillery battalion's TACFIRE.

The G/VLLD provides the capability to employ precision munitions. This technique is optimized in the defense when the brigade commander has identified a critical element of the battlefield within the area of responsibility of the light unit. In the offense, the COLT's signature will expose the position of the light unit as it infiltrates forward and the G/VLLD is too heavy for the light force to carry over an appreciable distance.

Summary of Communications TTP for Brigade Heavy-Light Operations

This chapter has focused upon the elements that affect the communications posture of units conducting heavy-light operations. These elements - limited range and lack of redundancy of communications systems within the light unit, integration of TACFIRE/non-TACFIRE systems, and secure equipment compatibility - present challenges to the brigade commander and his FSCOORD. They must resolve these shortcomings to ensure timely and accurate field artillery fires. The fielding of the light TACFIRE computer system will resolve many of the TACFIRE/non-TACFIRE problems. However, the other command, control, and communications problems will remain. The TTP presented in this chapter will assist in resolving these problems.

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3. U.S. Army Training and Doctrine Command, "Independent Evaluation Report For The Certification Of The Light Infantry Division," (Fort Leavenworth KS: TRADOC Independent Evaluation Directorate, August 1987): B-3 through B-4.

4. Michael A. Hamilton, "Heavy-Light Operations," INFANTRY MAGAZINE (September-October 1989): 25.

5. The Fire Support Team Digital Message Device (FIST DMD) will not be fielded to all Active Component (AC) light units until 4th Quarter, FY 94. The Forward Entry Device (FED) will not be fielded to all AC light units until 1st Quarter, FY 94. The Briefcase Terminal (BCT) will not be completely fielded until 3d Quarter, FY 93. Light TACFIRE fielding is expected to be complete in 3d Quarter, FY 93. Currently, none of these systems can communicate with heavy TACFIRE in secure mode as they use the VINSON system for secure digital communications, and the heavy TACFIRE computer uses the KG-31. The Advanced Field Artillery Tactical Data System (AFATDS), which will replace or supplement all these systems with fully compatible communications and secure devices, will not begin fielding until 4th Quarter, FY 95.

6. EIR, B-3 through B-4.

7. U.S. Army Operations Group Fire Support Trainers, "Field Artillery Pre-Rotation Briefing," (Fort Irwin CA: National Training Center Operations Group, February 1989): 80 - 81.

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CHAPTER 6

CONCLUSIONS & RECOMMENDATIONS

"If all is not in order, I will hang you;
despite my personal high regard."

Marshall Suvorov

CONCLUSION

The heavy-light brigade represents the continuing evolution of the United States Army. The Army recognizes a need for more heavy-light operations as evidenced in appendices to maneuver field manuals and increased training emphasis.

The precursor of modern heavy-light operations is seen in World War II at battles in the Bocage, near Tobruk, and on Kwajalein Island. Other examples include the Israeli's task organized heavy-light brigade used to assault Abu Ageila in 1956 and the United States' use of a heavy-light brigade to support the reduction of Prek Klok in Vietnam.

More recently, exercises, operations, and rotations at the National Training Center show that heavy-light operations continue to be executed. The legacy of this type of combat operation is the necessity for a flexible, task-organized force to conduct certain offensive and defensive missions.

Heavy-light operations in general, and brigade heavy-light operations specifically, are a natural evolution of the

Army's continual tailoring of its force structure and modernization efforts to meet global responsibilities and political objectives. As the Army focuses on the operational art, it will continue to mix heavy and light forces to obtain the optimum combination of maneuver, protection, and fire-power. As pointed out by General Galvin, we must be prepared to fight future tactical battles with a combination of heavy and light forces.

As illustrated in Chapter 2 of this thesis, fire support field manuals neglect tactics, techniques, and procedures to support heavy-light operations. The details of "how" to reinforce this operation with field artillery fires are unwritten, and consequently, must be learned when units train or fight while organized into a heavy-light brigade configuration. It is not enough to fall back upon the basic field artillery tenet that artillery supports the maneuver commander. The orchestration and synchronization of each phase of a heavy-light operation requires a well thought out sequencing of field artillery operations focused upon the desired result - disrupting, delaying or limiting the enemy.

Chapter 3 illustrated that heavy-light operations from World War II to present are not a new concept. However, this mission entails special considerations from the aspect of field artillery support.

The common historical threads that run through each of these conflicts when executing a heavy-light mission are:

1. A higher reliance on counterfires to protect the light (dismounted) infantry from enemy indirect fires.

2. The necessity to accurately track the location of the light infantry to preclude amicicidal fires.

3. The requirement to synchronize field artillery fires to support the movement of forces that move at differing speeds and on differing terrain.

4. The need to provide smoke and suppressive fires to conceal the light force and provide it protection from enemy counterattacks.

5. Recently, the communications methods and equipment between the heavy and light forces have diverged and require special considerations to ensure each can communicate with the other.

Chapter 4 of this thesis provided many of the critical field artillery tactics, techniques and procedures to support a brigade heavy-light operation. They were developed in combat and field training exercises. These TTP include techniques to provide protection to light forces through counterbattery fires. Using such techniques as carefully designing critical friendly zones and priority zones, the heavy-light brigade can substantially improve the survivability of the light battalion.

A tactic addressed was positioning and movement of field artillery firing units to provide continuous fire support to the maneuver force. During heavy-light brigade operations, this is difficult due to the differing speed of the units, their specific fire support needs, and movement plan of the field artillery battalion.

Six critical procedures to enhance field artillery support to a heavy-light operation were also provided in Chapter 4. These include the following procedures:

1. The maneuver commander in concert with his FSCOORD must design control measures and fire support coordination measures in a manner to facilitate execution of fires while providing requisite protection to maneuver forces as a whole.

2. Units conducting combat operations must report their locations accurately and in a timely manner.

3. The completed fire plan must be consolidated and distributed prior to the beginning of the heavy-light operation.

4. Fire support must be integrated into rehearsals conducted by the heavy-light brigade.

5. A joint fire support execution matrix must be completed before initiation of the heavy-light operation. This assists in synchronizing fires with maneuver.

6. The UBL of the heavy-light brigade's field artillery battalion must be modified with an increase in HE, smoke, and possibly illumination ammunition.

Chapter 5 focused on the elements affecting the communications posture of units conducting heavy-light operations. These elements, (limited range and lack of redundancy of communications systems within the light unit, integration of TACFIRE/non-TACFIRE systems, and secure equipment compatibility) present challenges to the brigade commander and his FSCOORD. They must resolve these shortcomings to ensure timely and accurate field artillery fires. The fielding of the light TACFIRE computer system will resolve many of the TACFIRE/non-TACFIRE problems. However, the other command, control, and communications problems will remain.

RECOMMENDATIONS

Chapter 2, Review of Literature, identified the paucity of tactics, techniques and procedures in fire support field manuals. In fact, these TTP manuals contain no discussion concerning heavy-light brigade operations. FM 6-20-30 TTP for Fire Support for Corps and Division Operations, FM 6-20-40 TTP for Fire Support for Brigade Operations (Heavy), and FM 6-20-50 TTP for Fire Support for Brigade Operations (Light) require appendices that address heavy-light

operations and the attendant TTP. The field artillery must integrate TTP for heavy-light operations into a fire support field manual or as appendices to current fire support TTP manuals for units in the field.

In addition, capabilities of the Q-36 FIREFINDER radar should be included in FM 6-71, Fire Support Handbook for the Maneuver Commander and appropriate maneuver field manuals. This will assist both the maneuver commander and his FSCOORD.

To enhance connectivity through digital communications, the light TACFIRE system needs to be fielded. The Army plans to field the system in 1995. In the meantime, the recommendations in Chapter 5 can assist the heavy and light units.

Field artillery units identified as having a high probability for supporting brigade heavy-light operations should receive a Modified Table of Organization and Equipment (MTO&E) that provides liaison teams with digital peripherals (such as the Digital Message Device, Variable Format Message Entry Device, or optimally a Brief Case Terminal). This will provide the light unit with an austere digital capability to plan and request fire support.

Maneuver units identified as having a high probability for conducting brigade heavy-light operations should begin frequent training to perform this difficult mission. This

includes wargaming sessions and use of computer simulations that culminate in field training exercises.

FUTURE INVESTIGATION

The focus of this study has been field artillery support for heavy-light brigade operations. A future thesis is recommended to study the requisite factors with respect to a division heavy-light operation.

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